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CARE OF THE BODY

—IN—

HEALTH AND DISEASE.

G. B. MABE, M. D.

CARE OF THE BODY

IN

HEALTH AND DISEASE

WITH A COROLARY ON INDICATION

OF

Character, Conversation, Manners, Etc.

BY

G. B. MABE, M.D.

EMBRACING A SCIENTIFIC DISCUSSION OF FOOD-STUFFS, AIR, WATER AND DIET IN RELATION TO AGE.

THE MOST COMMON DISEASES AND THEIR NURSING CARE AND FEEDING OF THE INFANT. MOST COMMONLY USED MEDICINES.

THE HEART AND CIRCULATION. VISION, TASTE, SMELL, HEARING AND FEELING. RESPIRATION, VOICE AND PHASES OF HUMAN LIFE.

WITH SOME OTHER VERY INTERESTING CHAPTERS ON IMPORTANT SUBJECTS.

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PREFACE.

This little book has been written with the intention of benefitting all its readers and I am quite certain that if they read it carefully, they will find something in it that is both interesting and beneficial to them.

There is quite a number of subjects treated of in the book all of which are of the highest interest to all classes of persons, the young and the old and the middle-aged, and I sincerely hope that it will prove useful to all those who read it.

G. B. MABE, M. D.

Big Stone Gap, Virginia, April the 1st, 1904.

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CARE OF THE BODY

—IN—

HEALTH AND DISEASE.

CHAPTER I.

ELEMENTS OF THE HUMAN BODY.

The study of any scientific subject requires for its full elucidation the investigation of all collateral branches that contribute to a clear and lucid understanding of it. The materials that go to make up the body are therefore first dealt with. The human body is composed, chemically speaking, of twelve elementary bodies—carbon, hydrogen, nitrogen, oxygen, sulphur, phosphorus, calcium, chlorine, sodium, magnesium, potassium, and iron completes the list. There are other elements found in minute traces in the body, but they are no doubt accidental. The first four named in the above list are in far greater proportions than the rest. Now as food and air are the sources from which the elements are supplied, it is evident that they should contain all the elements named in the foregoing list, and upon analysis they are all found in the animal and vegetable kingdoms of nature, from which man derives his food. Foods are derived from both animals and vegetables and are therefore classed as animal and vegetable foods.

A more scientific classification is into proteids or albuminates, hydrocarbons or fats, the carbohydrates and the mineral salts including water. The proteids embrace the various albumens, the leans of meats and various other principles allied to them. The hydrocarbons embrace all the fats, and oils, whether of animal or vegetable origin. The carbohydrates include all forms of starches and sugars. The mineral is made up of sodium, potassium, calcium, phosphorus and sulphur, in the forms chiefly of chlorides, and phosphates, water is also classed with the mineral.

The reader will remember that these four classes of food stuffs are absolutely necessary for the healthy maintenance of the body. Some foods contain all of them. Milk for example is a complete food, and the little child can therefore thrive on it alone for the first year or two of its existence, but for adults it is not a suitable food alone. The reason is that it is too bulky for the amount of nourishment it contains. The elements named already are in abundance all around us, but before they can be assimulated, they have to be converted into very complex forms; such as are found in the ox, the pig and cereals of plants as wheat and maize or corn. The ox feeds on grass and converts it into more complex substances suitable for the food of man, whereas the grass feeds on the inorganic kingdom and makes a suitable food for the ox. Thus in considering the origin of food we learn how the simplest vegetable forms grow and feed on the constituents of the atmosphere as well as of the soil. The ox nor the sheep cannot do this. The animal unable to construct organic matter

from the inorganic is dependent upon the vegetable world for his food, and man in turn is dependent upon the animal for some of his most important food stuffs. It might be said that plants pass their lives in preparing food for the animal, and the animal passes his life in preparing food for man. I will now consider food stuffs from a special standpoint.

Animal foods embrace such as the flesh of animals, milk, butter and eggs, and are exceedingly well adapted to minister to the growth and maintenance of the body. Some of the more important of them are beef, mutton, pork and bacon, fowl and game. Beef is an exceedingly valuable food and is best from the ox slaughtered at from three to five years of age. The digestibility of beef is inferior to mutton, and pork and bacon are less digestible than either of those named. I might quote from Professor Harrington's practical hygiene, the characteristics of good meats.

Meat should have an even uniform color. Neither abnormally pale nor inclined to purplish. It should have little or no odor, and such as it has should give no disagreeable impression, such as the sickly cadaveric smell, characteristic of diseased or decomposed flesh. It should be firm and elastic and should not pit nor crackle on pressure. On being handled it should scarcely moisten the fingers, and with keeping the exterior should become dry rather than wet. There should be no evidence whatever of the presence of parasites. Beef has a bright red color and a marbled appearance due to the presence of fat between the bundles of muscular fibres. This marbling is much

less apparent in the flesh of animals that have not been well fed, and of old cows and bulls.

Bull meat is darker than that of oxen and cows, and is coarse, stringy and of strong flavor. Veal is much paler than beef and less firm to the touch, and coming from a very young animal 'Bob-Veal,' it is flabby and watery and its fat has a tallowy appearance. Mutton should be of a dull red color and firm to the touch. Its fat is white; sometimes yellowish and hard. Lamb is somewhat less firm to the touch and has a decidedly lighter color than mutton. Pork is much less firm to the touch than beef and mutton, and its fat is quite soft in comparison. Horse meat, the use of which is increasing rapidly abroad and to a much greater extent in this country, than is commonly believed, is darker and coarser than beef, and possesses a very different odor. The fat is yellow and oily and has a rather disagreeable odor. The flesh of birds is not marbled like that of an animal. That of wild fowl that feed on fish has a strong flavor which is not improved by keeping.

The cooking of food, especially that of meats, is a very important thing. In boiling, in order that the meat should retain its flavors the meat should be dropped into boiling water and allowed to boil for five or ten minutes, and the heat partially withdrawn so as to bring it below the boiling point, and kept at about a hundred and eighty degrees, fahrenheit thermometor, until the meat is thoroughly done. Cooked in this way the meat will be tender, as well as to retain its flavors. Whereas if the temperature be kept at a boiling point until the meat is cooked the meat will be tough and hard.

If the meat be placed in cold water and the temperature gradually raised to the boiling point the meat loses its chief flavor, but however, if one wishes to make a good broth the latter method is the one.

In roasting, the meat should be placed in very hot lard; the temperature being kept high for five or ten minutes, and then partially withdrawn. The meat then will retain its flavors and be soft.

As to the frying methods I judge most people know enough of them. As they are not the best methods of cooking meats, I will say nothing on them.

Meats are sometimes infected with germs and parasites when otherwise in good condition. The most efficient method of their destruction is by thorough cooking. Persons have not unfrequently been infected with Trichinaspiralis by eating uncooked meat, producing a disease that very generally proves fatal.

Milk being a very important food, requires considerable care in keeping. Perfect cleanliness should be observed in milking, and it should be kept in a cool place and where there are no ill odors, as it very readily absorbs any foul odors.

Butter also will absorb foul odors in the same way.

Only the more important points connected with food stuffs can be dealt with in this place.

We derive from the vegetable kingdom a great variety of foods; many of them of a highly nutritious character. Unlike what is generally supposed, vegetable foods are less digestible than animal food, and there is more waste product from

them than there is from animal food. Some of the more important of the vegetable foods are wheat, maize, rye, oats, beans, peas and lentils. All those named have a great deal of starch in them; some of them small traces of fat. Wheat is probably one of the most important vegetable cereals; being largely used for breadstuffs; also corn, rye and oats are used extensively as foods. The roots and tubers as potatoes and arrow-root are also valuable forms of food, but less nutritious than any of those above named.

A great variety of fruits both in the fresh and dried state are used as articles of food and flavoring luxuries. The following are some of the principal varieties made use of;

Apples, peaches, pears, oranges, lemons, limes, plums, apricots, cherries, olives and dates.

The apple when cooked is easy of digestion, cooling and slightly laxative. Pears of good quality when ripe are better suited for eating raw than apples. Oranges are especially valuable for invalids, they are pleasant and refreshing and very grateful in feverish conditions. The lemon and lime are important as yielding a useful antiscorbutic juice. The grape is a very important fruit on account of its richness in sugar. It is very digestible when ripe, and acceptable to invalids.

CHAPTER II.

BEVERAGES.

All beverages contain water and as may be seen by reference to the various analysis of the solid foods water enters largely into their composition. The body itself contains about seventy per cent. of water.

Everything that is carried into the circulating fluids of the body or eliminated from them is conveyed by the agency of water. As a solvent it is indispensable in all functional activities. The consumption of a certain amount of water is absolutely necessary. Considerable amount of this is taken into the body combined with the solids of the food; but a certain quantity is required in fluid form, and this is supplied by beverages.

One of the best ways of supplying water to the body is by drinking it in its pure state. Its solvent properties can then be completely utilized.

The purer water obtained for drinking purposes which is from wells, springs, rivers and rainwater, contains mineral ingredients in solution. It is highly needful to insist on the importance which is now generally recognized, that the water we use for drinking purposes is free from all organic impurity. The minerals in otherwise pure drinking water are not often in sufficient quantity, or of a nature to be harmful for drinking purposes. This subject will be treated of further on.

As tea and coffee are so extensively used as beverages we might here notice them. Although they differ considerably from one and another in their physical character, they agree in containing principles, which are either identical or closely related. There is a considerable resemblance in the general affects of tea and coffee, as might be concluded, from the fact that they contain the same active principle. While the different aromatic principles, or essential oils they contain, and to the astringency of the tannin the tea contains.

The difference between green and black tea is simply dependent upon the difference of the time of gathering the leaves, and their mode of treatment. The green is prepared from the younger leaves and roasted soon after gathering.

As to the effects of tea as an article of diet, considerable difference of opinion exists, and especially as to the relative value of tea and coffee It should be recognized that there often exist individual peculiarities with regard to these beverages, and hence the conflict on this point

Tea removes fatigue, clears the mind and promotes intellectual energy. Like coffee, it has a tendency to diminish sleep when taken warm as it usually is; no doubt the warmth aids the stimulating influence. It increases the action of the skin and has been credited with producing constipation, which it no doubt does in many persons, owing to the tannin it contains

There can be no doubt that when tea is used to excess that it is harmful to many persons

Coffee is also an agreeable aromatic prepared from the seeds after they have been roasted The

Mocha and Arabian coffee is considered the best. The effects of coffee are those of a decided stimulant to the nervous system on account of its stimulating action on the brain. It lessons the need for sleep after exertion. It also diminishes the sense of fatigue. It has a decided stimulating effect on the heart, but in large quantities it usually slows the action of the heart When taken in excessive amount it will disturb the rhythm of this organ in many persons. It increases the elimination by the kidneys of the urine; also it increases the secretion of the skin. It sometimes disturbs digestion and gives rise to heartburn, and this is said to occur in persons who take it very strong just after meals.

In support of the value of coffee I might quote a few words from Yeo's Manual of Food in Health and Disease. "Although coffee can exert no direct nutritive action in the system, and it has been shown that its use tends to increase rather than diminish the excretion of urea, yet its influence in sustaining the human body under fatigue and privation is very remarkable. Parks bears strong testimony to its great value in the diet of the soldier. 'Not only is it invigorating without producing subsequent collapse, but the hot infusion is almost equally serviceable against both cold and heat. In the one case the warmth of the infusion, in the other the action on the skin being useful, while in both cases the nervous stimulation is very desirable.' It has been said to afford some protection against malaria. When coffee is taken as it usually is, together with milk and sugar, it then contains a considerable amount of nutritive substances

and forms a highly sustaining food. The valuable properties possessed by coffee are occasionally utilized in the treatment of disease, as an antidote for instance in opium poisoning or alcoholic intoxication. It is also given as a cardiac tonic in heart disease and as a diuretic in dropsy and urinary disorders."

ALCOHOLIC BEVERAGES.

Alcoholic beverages embrace whiskey, brandy, the various kinds of wines, champaigne, ale and beer are the chief of the beverages named. All these beverages are made by firmentation. Their intoxicating strengths are all owing to the per cent. of alcohol they contain. It is unnecessary in this place to describe the process of the making of them, as it would consume altogether too much space. They have been in use from very ancient times. It appears that wine was known soon after the flood, and beer was known to the Egyptians over four thousand years ago, and was largely used by the soldiers in the campaigns of Caeser.

The effects of alcoholic beverages have been written upon extensively. It appears to be a difficult matter to decide whether alcohol is a true food or not. This depends upon the meaning attached to the word food. There is no doubt that part of the alcohol taken into the system is oxidized, but it is quite a doubtful matter if any of it is converted into the tissues of the body. Its stimulating effect is well known, and depends largely upon the amount taken. In small quantities by stimulating the secretion of the gastric juice it increases the appetite, but in large quantities it has the op-

posite effect and arrests digestion. Small quantities exalt the feelings and large quantities depress them. It is most important that we remember that the effects of alcohol vary greatly in different individuals, and that what may be sufficient to produce a pleasant effect in one person will intoxicate another.

Indeed it is mainly on account of the remarkable difference in its effects on different individuals that so much misunderstanding exists as to its character.

Some strong advocates of the use of alcohol in disease regard it as a useful food if taken in moderate doses.

Experiments would seem to show that for a healthy adult individual that one ounce of brandy or whiskey is a sufficient dose for one time, and that should not be repeated under six or eight hours. This is meant of course to only be given in emergencies.

Women are more easily effected by it than men, and persons of a nervous temperament than the robust. I might here quote from Yeo's Manual of food in health and disease. "That alcohol taken in small quantities improves the appetite and beneficially increases circulatory activity is almost universally admitted. Of its value as a sedative to the nervous system in certain diseased conditions there is also nearly a general acknowledgment, as to its influence on the work of the body, physical and mental, it would seem, when taken in the moderate quantity above stated, to be healthful under many circumstances. Taken in larger quantity on the contrary to be almost invariably

harmful. Women seem more susceptible of its injurious effects and should take it with even more moderation than men, and healthy children should do without it altogether. Alcohol taken in excess is known to lead to very serious morbid changes in nearly all the organs of the body. Chronic inflammatory and degenerative changes of a granular fibroid and fatty nature attack the stomach, liver, lungs, kidneys, the brain and its membranes, and especially the blood vessels."

In regard to the influence of alcoholic beverages on digestion some authorities claim that when used in small quantities about meals that they aid digestion. My impression is that in most persons that would be merely temporary that if they are continued for any great length of time they are apt to impair digestion. There can be no doubt that healthy persons are better off without them than with them. In treating on alcohol as a medicine, I will say more on this point.

As to the strength or the per cent. of alcohol in the various beverages, those of the weaker kind are less likely to do harm than the stronger ones.

Brandy and whiskey have from forty to fifty per cent. alcohol. Usually wine has from five to ten per cent. alcohol. Beer from two to five per cent. and champaigne from ten to twenty per cent.

Whiskey and brandy when new always have fusel oil in them, or amilic alcohol, which is gradually changed by age and gives flavor to the spirits. But it is two or three years before the changes take place. For that reason whiskey or brandy when new ought not to be used. The fusel oil has a poisonous effect, All the spirits, those that are dis-

tilled and those that are not, are often adulterated with various drugs, and of course are not fit for use.

CONDIMENTS.

Condiments are used for the purpose of flavoring and exciting appetite, and to promote digestion. They greatly increase the pleasures of eating; they stimulate the digestive juices, and some of them are distinctly antiseptic. The most important and most extensively used is common salt. Common salt is useful in several ways. It is necessary to the tissues of the body; it is found in all the tissues; it breaks up to help form the acids of the stomach, and is a powerful antiseptic, and is a good diuretic. Also it is used extensively to preserve meats.

Vinegar is also a very important condiment extensively used to give flavor to many articles of food. It is also highly antiseptic. It stimulates the appetite and promotes digestion.

Peppers and spices, cloves, mint, thyme, fennel, and sage are all condiments that are to some extent useful in stimulating the appetite and digestion.

THE PREPARATION OF FOOD FOR EATING.

In very ancient times many nations eat their foods raw; their cereals, wheat and maize and other grains, and at the present day some persons eat their meats raw, but there can be no doubt that with a few exceptions, foods should be cooked before being eaten.

Milk is rendered more indigestible by being

cooked and is not as palatable. Some articles of food are better half cooked. Eggs are much more digestible half done than well cooked.

Cabbage is more digestible hardly done than thoroughly cooked. With those exceptions boiling and roasting and baking should be thorough.

The cooking of foods greatly improves their flavors; especially animal foods, and renders them pleasant to the palate. In the next place it renders food more easily masticated, and contrary to the opinion of many, it renders them more easy of digestion.

It has become an almost universal custom in civilized life to have a fixed time of day for taking meals. In some countries some classes of persons eat four times a day; some three times, and others only twice. In fixing the intervals which should occur between meals it is necessary to bear in mind that digestion varies considerably in different persons, and is influenced by occupation. It usually requires from three to four hours in a healthy man to digest an ordinary meal. In growing persons and children digestion goes on faster than in mature age. The first meal of the day is breakfast. In case of active persons of regular lives should be taken as soon after rising as possible. It has been said persons who have to take exercise before breakfast are either dyspeptic or overfed. The unfed person at this period of the day is said to be more subject to the influences, and especially prone to take harm from exposure to cold. It is impossible to lay down any definite rules to guide all individuals in their methods of taking food. Three times a day seems to me a very appropriate way

of taking meals. A habit of eating between meals is harmful to digestion, as it disturbs the stomach in its operations.

CHAPTER III.

FOOD IN RELATION TO AGE AND CONDITION.

In considering the proper relations between the amount of the food taken and the age of the individual and the conditions under which he is living, we have to bear in mind that there are three periods after the sucking period that require special attention.

The age of growth, the period of adult life and that of old age. In the age of growth food is not only used for repair but for growth also, and for that reason growing persons should have a greater allowance in proportion to size than the adult. In children a great deal of care is necessary that the food be light and properly prepared; otherwise they often become dyspeptic. Especially they should have a light supper.

In the adult the amount required is very variable, owing to the various occupations and habits and conditions of the people. It might be said that the appetite if it has not been perverted, and is not influenced by disease, is a fair guide.

In regard to food in advanced age I will here quote from Yeo's Manual of Food in Health and Disease. "With advancing years the functional activity of the bodily organs diminishes. The capacity for physical exertion is considerably weakened, and the mental powers usually begin to flag. The functional activity in the digestive

organs partakes in this general decline; so that while there is less need for food on account of lowered physical and mental activities, there is also less power of digesting and assimilating food on account of the slowly progressing degenerative changes in the secreting glands, and the consequent diminished digestive and absorbant power in the alimentary canal. The circulation through the abdominal organs also tends to become languid, so that absorption is thereby delayed and may be further hindered by degenerative changes in the blood vessels themselves.

Moreover the muscular walls of the intestine lose their tone and contractive power, there is a tendency to dilatation, especially of parts of the large intestine, causing delay in the expulsion of the residual feces, so that constipation and flatulence tend to add further to the embarrassment of the digestive function. All these inevitable changes necessitate appropriate and corresponding changes in the amount and kind of food taken. In the first place the food must be diminished in quantity as the increase in age. Says Sir Henry Thompson, less energy and activity remain and less expenditure can be made. Less power to eliminate is possible at fifty than at thirty, still less at sixty and upwards. Less nutriment must therefore be taken in proportion as the age advances; or rather as activity diminishes or the individual will suffer. If he continues to consume the same abundant breakfast, substantial lunches and heavy dinners, which at the summit of his power he could dispose of almost with impunity he will in time certainly either accumulate fat or

become acquainted with gout or rheumatism, or show signs of unhealthy deposits of some kind in some part of the body. Processes which must inevitably empoison, undermine or shorten his remaining term of life. He must reduce his intake because a smaller expenditure is an enforced condition of existence. At seventy the man's power has further diminished, and the nutriment must correspond thereto, if he desires still another term of comfortable life. And why should he not? Then at eighty with less activity there must be still less support, and on this principle he will yet long continue.' And in another work Sir Henry again comments aptly on this subject. 'It is absolutely certain contrary to the popular belief that while a good supply of food is essential during the period of growth and active middle life, a diminished supply is desirable in relation to health and prolongation of life during declining years. When physical exertion is small and the digestive faculty becomes less powerful also. The system of supporting aged persons as it is termed with increased quantities of food and stimulants is an error of cardinal importance, and without doubt tends to shorten or to imbitter life. As age increases the ability to eliminate food unnecessarily consumed notably diminishes. The elderly man who desires to preserve fair health and to retain the longevity should gradually diminish his use of strong nitrogenous and much fatty food.'

In Prof. Humphrey's report on centenarians published in the reports of the collective investigation committee of the British Medical Association it appears that in their habits in the matter of eat-

ing and drinking tended as a rule to great moderation in both. The large majority were small or moderate eaters. Of animal food the majority took but little. Of thirty-seven, three took none, four took very little, twenty took little, ten took a moderate amount and one only, took much. The exact quantity is mentioned in nine instances. One took twelve ounces, one six ounces, one five, and six took four ounces daily. In the use of alcoholic drinks we also find evidence of great moderation. Fifteen were either all their lives or in their old age or youth total abstainers. Twenty-two took but little; two very little; ten a moderate amount of alcohol, and some who had taken a little alcohol formerly were taking none in their old age. It is remarkable how numerous in the published records of centenarians are the references to the great sobriety, temperance and abstemious habits of the immense majority of persons who have reached great age; and especially frequent is the statement that they have partaken very sparingly of animal food."

Men of eighty or ninety years should exercise considerable caution in making any very decided change. Any change in the quantity of food taken should be made gradually. The proportion of animal to vegetable food should not exceed more than one of the former to three of the latter. It is considered best at this period of life that the time of taking food should be oftener, and some authorities think that they should be fed during the night of food in the fluid form. They often rest better by doing so.

FOOD IN DISORDERS OF DIGESTION.

In diseases of the digestive organs which are concerned in digestion and assimilation of food must necessarily and especially be under the influence of dietetic treatment. The subject of the dietetic treatment of diseases of the organs of digestion is quite a difficult one as it involves some obscure and disputed points about digestion, and is associated with controversial questions in which the general public take prominent interest.

I here cannot do better than quote from Yeo's Manual of Food in Health and Disease concerning acute gastric catarrh which is often called dyspepsia or acute indigestion. He says— "Acute Gastric Catarrh is a common disease, and is caused usually by the action of improper and irritating food on the gastric mucuous membrane. Any local irritant may of course excite inflammation of this membrane if brought in contact with it, and acute gastric catarrh is an almost invariable accompaniment of irritant poisoning; but the common and familiar forms of this disease are most frequently the result of improper feeding. Some persons are however much more predisposed to suffer from this disease from comparatively slight causes than others. It has been pointed out that too scanty a secretion of gastric juice by retarding digestion and favoring abnormal decomposition of food within the stomach predisposes to this malady. Hence it is necessary in febrile states when owing to the high temperature there is much loss of fluid from skin and lungs, and therefore diminish secretion of gastric juice, to diminish accordingly the

quantity of food. The common custom of urging such patients to take more nourishment than they wish is often injurious, unwise and unphysiological. Anemic and feeble persons generally and convalescents from acute disease are also liable to attacks of acute gastric catarrh from taking more food and a small amount or the altered less active character of their gastric juice is capable of dealing with, that some of the undissolved ingesta decompose and set up irritation of the gastric mucous membrane. It is indeed most important to bear in mind that the over-anxiety manifested by the friends of such patients that they should take large quantities of food in order to quickly recover their strength has often the opposite effect to the one desired. Overloading the stomach with food in healthy persons is a common cause of acute gastric catarrh owing to the abnormal decomposition which the excess of ingesta undergoes. This is a frequent cause of gastric catarrh in young children and especially children at the breast who are allowed for the sake of quiet to suck until they have overloaded their stomachs. Imperfect mastication also may give rise to gastric catarrh as the food then reaches the stomach in a comparatively undivided state, so that the gastric juice comes into very imperfect contact with it, and hence portions remain undissolved and undergo decomposition.

Rich and fat sauces and too much fat eaten with meat may lead to the same result. By covering or soaking the meat with an oily fluid which prevents the gastric juice from thoroughly penetrating it.

Food eaten when it is already in a state of decomposition may similarly give rise to gastric catarrh and this is especially noticable to delicate and sensitive persons.

Game or fish kept too long and entrees made with meats that are not perfectly fresh, sour beer and wine, and in young children milk that is not quite fresh are fruitful sources of gastric catarrh. Too free use of spices and stimulating condiments, but especially the habit of taking alcohol in a concentrated form with respect to food is to so limit it in quantity and quality that the acutely inflamed mucous membrane shall be spared all irritation or excitement from ingesta and the whole organ so far as is possible be put in a condition of physiological rest. Entire abstinence from food, at least from the mouth may often be enforced with advantage for a day or two; or so long as the taking of food excites nausea, vomiting or severe pain. This abstinence is usually well borne except in cases where the strength has been exhausted by a previous suffering and long inability to digest a sufficient quantity of food. In such cases nutriment enemata may for a time be given so as to secure the rest needed by the irritated gastric mucous membrane, while small quantities of ice water may from time to time be taken into the stomach.

When we restrict patients to liquid food it is best to give it in small quantities at short intervals; and when there is much thirst it is better to allow small pieces of ice to be sucked than to permit large draughts of cold water. In many of the less severe cases while still adhering to a fluid dietary we may provide the patient with a certain variety

of food. When milk is well borne either pure or diluted, raw or boiled, it forms the most convenient and nourishing basis of our dietary, but we may prescribe chicken or mutton broth with the express juice of vegetables boiled in it."

The chronic form of this disease is often a sequel of the acute affection. Its causes are chiefly the same, errors in diet, the use of alcoholic beverages which in some individuals of a weak nervous organization predispose to the chronic variety of the disease.

The dietetic treatment of this disease is to put the patient on a light diet. Milk in some instances disagrees. In fact too large a quantity of any fluid food will disagree with a dyspeptic. A small amount of solid food that has been properly prepared with milk and broth will agree better in chronic cases than an absolute fluid diet. Well cooked vegetables in moderate quantities changed from day to day or meal to meal suit many patients very well, combined with light meats, like mutton, fat chicken and game. A person should eat slow and chew his vituals well. His habits of life should be as cheerful as possible for anything that depresses the nervous system is decidedly against a dyspeptic. He often gets into a habit of using drugs from his own prescription, and many times they are detrimental to him. In regard to that, it would be best to consult an enlightened physician.

CHAPTER IV.

AIR.

Air is a colorless and nearly odorless mixture of oxygen, nitrogen, argon, carbonic acid, aqueous vapor and traces of other substances. It was once thought to be an element until about one hundred years ago it was shown to be composed of about twenty parts of oxygen, to seventy-eight parts of nitrogen—not in chemical composition but as a mixture. Ten or fifteen years ago another element was found in it called argon. There is hardly one per cent. in any air samples yet examined. The most important ingredient is oxygen, which is the great life giver to all animals, and it is very remarkable to find it so uniformly defused all around the globe—and even in large cities where vast amounts of it are consumed it is rapidly replaced. The only danger we have to fear for want of it is in confined spaces without sufficient ventilation. Aqueous vapor is a normal constituent of the air. The quantity in the air varies greatly and is influenced by the temperature mostly—the higher the temperature the greater the capacity of the air to hold vapor, and when the air takes up all that it is capable of holding without being condensed into a fog it is then called saturated. The air is never completely free from it—in other words dry air is only of artificial production.

It exerts a very important influence. By day it absorbs part of the sun's heat and tempers the

air. At night it acts as a protector to the earth by preventing too great a loss of heat by radiation. In countries where there is a very dry air, as in the desert of Sahara, after the hottest days the nights are very cool, falling forty or fifty degrees C. scale, so that it is evident that if there were no aqueous vapor at night the earth would lose heat so rapidly as to freeze in the summer time in warm climates.

Dust and microorganisms are associated with aqueous vapor in the air. They too are everywhere except out in mid-ocean there is organic and mineral dust and it has its origin from particles of matter that rise from the earth. Micro-organisms are abundant in inhabited rooms and in large cities the air is swarming with them—to a less extent in the country. Many of them are harmless but there can be no doubt that the air is the great carrier of disease producing micro-organisms.

Experiments have shown that at great heights the air is free from them. Media for breeding organisms have been exposed at a height of eight thousand feet above the surface of the earth with a negative result. Also the same experiments hundreds of miles on the ocean prove the same.

As stated before, the air is a carrier of micro-organisms. It has been found that the bacillus of tuberculosis is in an active state in the dust of a room a year after the death of its occupant from the disease. Their presence have often been demonstrated in the air of hospitals for tuberculosis, and in private houses inhabited by phthisical persons, and by exposing the dust of rooms inhabited by phthisical patients to susceptible animals the disease has been produced in those animals.

Many of the pathogenic organisms have been found in the air. In regard to the organism of typhoid fever there are two views as to the mode of introduction into the human body, supported on either side by able authority. There are a large class of eminent physicians hold that the air does not carry the bacillus of typhoid; that the sole method of introduction is by water and food. On the other hand, many equally as eminent hold that the air carries the organism that produces the disease. I am satisfied from experience in practice that the organism is carried by the air.

In practice in a very mountainous district through which railroads were being built I have seen a large number of cases, the diagnosis of which was made clear, and on investigation the water was found to come out from under the mountains uninhabited and uninhabitable in many places, and there could have been no possible chance of pollution of the water by the typhoid bacillus. I also am satisfied that the water may be polluted and the germs conveyed to persons in that way.

There is positive evidence that the bacillus of diphtheria is conveyed by the air. The organism that produces pneumonia is evidently conveyed by the air. There is reason to believe that the organism that produces cerebro-spinal meningitis is conveyed by the air. Respecting the influence of fog, which is prevalent in some districts more than others, mostly in low countries or gorges of mountains, but not unfrequently on the highest mountains, and in large cities sometimes is a visitant for weeks. I cannot do better than quote Professor Harrington in his Practical Hygiene.

"Dust and moisture together in the form of fog affect the health of large communities in a marked degree. In a still air nearly or completely saturated particles of dust and soot to become a nucleus of a minute droplet of condensed moisture. These countless droplets in a state of suspension form a more or less dense blanket of fog which impedes dispersion of the impurities given off by natural processes and as products of combusion. While ordinary country and seashore fogs are not known to exert deleterious effects. In smoky cities like London the case is quite different. It is a well recognized fact that during periods of heavy fogs in manufacturing centers the morbidity and mortality from respiratory disease are increased very greatly; and that as the atmosphere clears a sharp decline follows.

In London for example, the usual death rate—from all causes has been known almost doubled during a fortnight of continued dense smoky fog, and then to return to its normal figure with the advent of clear weather. The increase being due particularly to bronchitis and other affections of the respiratory tract attributed to the finely divided particles of soot and the acid which accompany them. During the prevalence of thick fog, the air being necessarily in a stagnant condition it has been observed that the carbon-dioxide content increases progressively. During one such period following bright weather the air of London acquired in four days, three and a half times its normal content of this gas."

In malarial regions there is a great deal of proof to substantiate the fact that the germs of malaria

are in the fog, and persons exposed to those fogs often have the disease when others living in the same houses who are not exposed to the fogs escape the disease.

SOIL.

Many experiments go to prove that the soil contains organism in great abundance. Not only those of an innocent character but disease producers, and from examination of many samples it appears that rich soil have vastly more than poor soil. And this is borne out by the clinical fact that wealthy landed countries have greatly more sickness than poor landed countries. It would appear from experiments made with shallow soil, or the crust of the earth, and that from a depth, that pathogenic organisms cannot live at a great depth. However, they are only found near the top of the ground. A few feet down has proven negative in all the experiments that I have noted of being made, and there is reason to believe that the soil is the breeding place of most pathogenic organisms; and when the water is contaminated it is through the medium of the soil, and those floating in the air, many, if not all of them are vaporized with the aqueous vapor from the earth.

Respecting pulmonary tuberculosis or consumption of the lungs as regards the soil or earth, I will here quote from Harrington's Practical Hygiene the following:

"There is an undoubted connection between this disease and soil dampness, which is most manifest when one investigates the prevalence of the disease over the same soil before and after soil

drainage, by which it will always be found to be diminished. Why this is so we can only conjecture. We know that dampness is one of a possibly considerable number of factors in producing predisposition to the disease. We know that other conditions being the same, the disease is far more common on low damp soil than on elevated dry ones. We know also that the disease is comparatively rare in some parts of the earth where the soil is exceptionally dry. The distribution of the disease and its relation to soil dampness were first brought to public notice by Doctor Henry I. Boditch of Boston, at the annual meeting of the Massachusettes Medical Society in 1862, who submitted investigation, which were in substance, that damp reason of proximity of bodies of water is an exciting cause of consumption; which disease can be checked in its course or even prevented by proper attention to soil conditions. Shortly afterward similar conclusions were promulgated in England by Doctor Buchanan, who had been making observations along the same line, not knowing that Doctor Boditch was similarly engaged. These propositions were accepted by the profession and have been maintained ever since."

BACTERIA IN WATER.

People generally know that even good qualities of drinking water are swarming with bacteria or minute organisms; and no doubt many, should they view their drinking water with a microscope of high power, would not use their water. For the most part these little organisms are harmless; and scientific investigators tell us that they serve

an exceedingly useful purpose. It is certain that they can be found in all water; both of good quality and impure water, but occasionally the water carries disease producing organisms. There are only about two diseases that we have anything like positive proof, that are conveyed to persons through the medium of the water, and those are asiatic cholera and typhoid fever. Of those two diseases there is positive proof that the organisms find a suitable place to live in water, and of course could easily be introduced into the systems of men.

SPACE REQUIRED FOR GOOD VENTILATION.

The space required for good ventilation is not as well known as it should be. I here below quote from Harrington's Pratical Hygiene:

"If it be agreed that for the most perfect result an adult requires a narrowly supply of three thousand cubic feet for the removal of his own effete matters, to say nothing of the accessory impurity dependent upon illumination, the next question is as to the amount of cubic space necessary per capita. That is to say—through how small a space that amount of air can be drawn hourly, without disagreeably perceptible draughts. The sensation of draughts is governed very largely by the temperature of the moving air, a cold slowly moving current being more susceptible than a Draughts which are productive of discomfort are more dangerous than the ordinary vitiation of the air, and therefore complete ventilation with draughts is worse than partial ventilation without draughts. It has been shown by Pettenkofer that with the aid of delicate apparatus and mechanical power,

about twenty-five hundred feet can be passed without draughts through a space of four hundred and twenty-four cubic feet in an hour. That is to say—through a room eight feet square and six and one half feet high the air can be renewed six times.

The minimum space within which one can receive under artificial conditions six complete changes of air in one hour is therefore four hundred and twenty-four cubic feet; but in order to get three thousand cubic feet in one hour the air would have to be changed seven times, and so the required minimum space would be five hundred cubic feet. In large spaces however, it is possible to obtain draughts. Thus in a hall forty by twenty by fifteen feet, forty persons may be supplied with three thousand cubic feet each per hour, and each one will have three hundred cubic feet of air space. Therefore in dealing with large spaces we may assume three hundred cubic feet per capita rather than five hundred. In ventilation of small spaces there is in addition to the possibility and danger of draught a great difficulty that the inlets and outlets are necessarily so near together that much of the air will pass directly from one to the other without having mingled with the main body of the air, and without therefore doing the slightest service in diluting the impurities present. In large air spaces this objection does not apply with equal force for the opportunity for diffusion is greater the larger the space, although of course hereto the inlets and the outlets may be so placed as to favor the formation of direct currents. In the ventilation of large spaces in which large numbers of people gather, as churches, theatres and

lecture rooms, we are at once confronted by the fact that three hundred cubic feet of space is a more liberal per capita allowance than is often practicable, and that this space is incompatible with a draughtless ventilation by the necessary air volume. If then the question be asked how to provide the necessary amount there is but one answer—namely, that it cannot be done. Fortunately however the danger from impure air is proportioned to the length of time of exposure an occasional short time spent in a crowded room or public conveyance filled with bad air being less harmful than prolonged and habitual occupancy of a room in which the air is less vitiated but not yet good.

In general it may be said that the importance of ventilation varies with particular air spaces. Those which are used only at intervals and for short periods have much less need of it than those which are used uninterruptedly.

Those which are not crowded demand less than those that are. Those used only for the moment need no consideration whatever, the natural forces at work at all times being sufficient for their needs. To insist on thorough ventilation of every part of a house at all times as most amateur hyigenists do, is to demand a needless waste of energy and money, for except in warm months when the windows and doors are left freely open for the sake of not only ventilation but of general comfort, ventilation goes hand in hand with heating and divides the expense. Nor can one successfully insist upon any rule that each person must have at least a thousand cubic feet of air space with renewal of the contained air once in twenty minutes; for to do so is to urge

in the case of the poor of large cities, an impossibility.

BATHING.

The importance of bathing has long been known for the removal of dirt and filth and infectious matter, and the healthy influence it has on the skin being an eliminative organ, and one of natural defense.

Cold baths are those in which the temperature of the water is below 65 degrees fahrinheit; cool between 65 and 80 degrees. Those between 80 and 90 are called tepid; and when above 90, up to the temperature of the body, they are called warm; and when above the body temperature they are called hot; up to as hot as one can bear.

Cold bathing is stimulant; the vessels of the skin contract at once and send the blood inward; the perspiration is gasping in character for the moment, then slowed and increased in depth. The nervous system and all of the mental faculties receive an immediate powerful stimulus; the pulse is usually slowed. On emerging from the cold water the breathing and pulse return to their normal rates. The vessels of the skin relax and dilate, and the return of blood in increased volume to the surface gives a sensation of warmth. This is regarded as the normal reaction.

The proper time for cold bathing is on rising in the morning, and should not be taken at night. Cold bathing is not safe for persons advanced in years in whom the arteries are rigid, nor for those with a poor circulation.

Strong persons it is said, are fortified against

taking cold by cold bathing. In sea bathing the element of enjoyment has a most important influence; the public attribute good effects to the salts in the sea water, but it is very doubtful whether they have any beneficial action or not. Warm bathing causes the opposite effect of cold bathing That is they dilate the vessels of the skin and often produce sweating.

The breathing and pulse are increased in frequency and the effect produced is soothing. Hot bathing is a grateful means of reducing soreness of the muscles after severe exercise, and is a valuable agent in producing sleep to persons who cannot rest at night. For purposes of personal cleanliness the warm bath is better suited than the cold, since it can be endured with comfort very much longer, and the relaxation of the skin which it induces is more favorable for the removal of impurities. In case complete bathing apparatus are not at hand persons in that event may sponge themselves, and with dry towels clean themselves thoroughly.

PHYSICAL EXERCISE.

It is quite an essential thing to maintain health, that a well nourished body shall be exercised properly. The effort of the muscles involved in what is designated as Physical Exercise, and in the pursuit of certain callings which necessitate exercise affects not alone the general musculature but the organs of the body in general as well as the heart, lungs and digestive apparatus, skin kidneys, brain and in short—all parts of the body. The heart and lungs being stimulated to increased

action, a greater blood supply is sent to every part of the body, carrying with it essentials to full nutrition and conveying to the eliminative channels the waste products of the body. The special stimuli of the various organs are excited, and the several functions are maintained in a normal state of activity.

In order to appreciate the benefits of physical exercise we can but compare the rugged condition of the well nourished laborer in the fields, or of the student or man of business who in the intervals away from his work seeks recreation in out-door exercise or gymnastics with that of the pentup sedentary operative, or the indolent seekers of pleasure involving inaction. Whether the work of the individual be that of the hand or brain, it is sustained better if the system is kept active in all its functions and parts.

I will here quote on the kinds of exercise from Professor Harrington's Practical Hygiene:

"Exercise as a hygienic measure may be divided into out-door work including walking, riding and athletic sports, and in-door work or systematic gymnastic exercises. The former preferred by all English speaking people are carried on under far more healthy condition and bring with them a much greater measure of enjoyment than the latter, which are preferred on the continent more especially by Swedes and Germans. Indoor work in the gymnasium is as a rule purely work without the element of pleasure either in anticipation or during its continuance, and is performed as a serious duty. It is carried out from day to day for a longer period if done in company with others, as

in a class; in which case emulation may stand in the place of actual enjoyment. But ordinary indoor exercise with Indian clubs, dumbbells, chess weights and similar appliances carried on alone in ones room is usually most unsatisfactory in its results. There are some doubtless who regularly take a certain amount of this class of exercise enjoy it and profit by it, but commonly the enthusiasm which attains the purchase of the appliances decline in a marked degree by the end of the third or fourth day of use and have disappeared in a week. Soon the exercise simply a duty developes into a bore, for the monotony of this kind of work into which no sense of achievment enters except that from the accomplishment of a wearisome round of strokes measured by hundreds produces a distaste, and soon the work becomes spasmodic, the intervals growing longer and longer and finally is abandoned completely."

CLOTHING.

The matter of clothing being such an important one I cannot do better than to quote from the author quoted above:

"The objects of clothing are aside from motives of decency, to protect the body from the sun's rays in hot weather, from the chilling influence of winds in all weathers. From rain and other forms of wet, and from mechanical and other external injuries and discomforts. To conserve the body temperature and to prevent interference with the natural functions of the skin, and finally to adorn the person.

The proper fulfillment of these various objects

is dependent upon the nature of the material, the looseness of its texture, its color, its hygroscopicity and heat conductivity, and its special adaptability to some particular purpose. The heat of the sun's rays is absorbed to the greatest extent by black materials and least by white. Next to black comes the dark, shades of blue and then in order green, red and yellow. Heat is reflected most by white and then in order, the light shades of yellow, red, green and blue. The color of undergarments not exposed to the rays of the sun exercises no influence whatever. The looser the texture the greater the amount of air in the interstices. And air being a very poor heat conductor, other things being equal, a loosely woven fabric prevents loss of body heat in still air more than one of closer texture. Thus it is that a thin loosely woven garment of woolen is warmer to the body in a still, cold atmosphere than an equal amount of closely woven material of the same or other kind. The same result is attained by wearing a number of garments, one over another, so that having layers of confined air between they act in the same way as double windows on a house.

The value of furs as conservators of heat is largely due to the amount of air retained between the individual hairs. Impermeable materials being absolutely wind proof and hence permitting no natural ventilation through their substance, are very warm, but have serious disadvantages, the most important of which is the retention of the transpired moisture of the body which collects on the surface and is absorbed only in part by the clothing next thereto. Against rain and cold

winds impermeable materials afford very great protection. Winds act in two ways to chill the body; by constant removal of the air in contact with the body, and warm by reason of contact and by hastening evaporation of the moisture within the substance of the clothing.

HEAT-CONDUCTIVITY.

Materials vary widely in their power of heat conduction. Among the textiles, linen and cotton are by far the best conductors and wool the poorest; but since the conductivity of a garment is governed mainly by looseness of texture, it follows that the same amount of a good conductor loosely woven may be warmer than wool woven very closely, but the fabrics made of the best conductors are commonly very closely woven, and of wool are of varying degrees of looseness.

HYGROSCOPICITY.

Fabrics hold moisture in two ways. First by retaining it in the interstices between the fibres and secondly, by absorbtion directly into the substance of the fibres. The moisture held in the interstices gives a sensation of dampness of wetness, and may be largely removed by pressure as in wringing. That absorbed into the fibre may be very large in amount without giving any sensation of dampness, and it cannot be expelled by pressure. The latter is known as hygroscopic moisture.

Materials of animal origin are more hygroscopic than those of the vegetable world; and while they absorb water readily they part with it more slowly

by evaporation; thus it happens that a person sweating to the same extent and under the same general conditions feels less sensation of chill on resting from his exercise or work when clothed in woolen than when his dress is linen or cotton. In the latter instance the moisture is held more largely in the interstices and the garment may be distinctly wet and it then adheres to the skin which as evaporation proceeds becomes chilled through rapid abstraction of the heat required in the process; whereas in the former the evaporation is gradual and the chilling much less perceptible or unnoticable. But here again a hygroscopic material very closely woven may be incapable of holding as much moisture without imparting a distinct wetness as one of a loosely woven substance of low hygroscopicity.

MATERIALS.

The materials employed in the making of clothing come mainly from the animal and vegetable worlds. From the former are derived the wools of various kinds, silk, furs, feathers and down and leather. From the latter the principal derivities are cotton and flax; and of lesser importance, straw, hemp jute, and rubber. Wool of various kinds is yielded by a number of different genera of animals. That in commonest use and to which the name is very generally restricted is derived from the sheep. Other kinds include mohair from the Angora Goat, Cashmere from the thibet goat, camels hair and alpaca from a Cameloid ruminent of South America; but the terms mohair, cashmere and alpaca commonly refer to cotton and sheep's

wool imitations containing no trace of either of these more expensive wools. Under the microscope the fibres of wool are seen to be cylindrical and translucent and covered with small imbricated scales which like those of a fish or the feathers of a bird, run all in the same direction. They are sharpest and smallest and hence more numerous in the finest sorts. As many as 2800 and as few as 500 to the inch has been counted respectively in the best and very inferior kinds. They give to the fibres the tenacity with which they cling together when woven and the readiness with which when wet and subjected to pressure as rubbing or wringing, they mat together and cause shrinking of the fabric. Woolen goods being poor conductors and containing much enmeshed air are the most valuable of all textiles for general purposes in all climates, and particularly in those in which abrupt and wide changes of temperature occur. In very hot climates they are inferior as outer garments to cotton and linen, which being better conductors and reflectors assist more in keeping the body comfortably cool. But for under garments wool is much better as a protection against chilling after active exercise on account of its hygroscopic properties. The vapor from the body is condensed and absorbed, and the heat which becomes latent when the moisture is vaporized, is set free, and the evaporation from the fabric to the external air proceeds slowly and without chilling effect observed when one sits in clinging wet cotton or linen which feels cold in proportion to the rapidity with which it dries. Woolen fabrics are much subject to adulteration with cotton and other cheaper mate-

rials. What are known as flannelettes are very commonly made wholly of cotton or with a very small percentage of wool. Although the name is intended to convey the idea that wool is the sole or chief material used. What some are pleased to designate sanatary flannel is often largely or wholly cotton. Shoddy is a fabric made with varying proportions of old raveled woolen and other cloths with a minimum of new wool. It has, as may be supposed, a much inferior tensile strength and less uniformity of texture than woolen of good quality.

SILK.

Silk is the spun fibre produced by a number of species of insects, especially the Larvae of the bombbycid moths called silk worms. To form cocoons or protective coverings when about to assume the chrysalis stage. The cocoon in which the chrysalis is killed yields an exceedingly fine thread. When unwound measures more than two miles in length and when spun yields in the neighborhood of five hundred yards of silk thread. The outer part of the cocoon is of inferior quality and is known as floss. Silk is very hygroscopic. It is a poor conductor and a perfect nonconductor of electricity. It has great affinity for anilin and other dyes. Under the microscope the fibres appear as structureless tubes and show no scales or surface markings such as are seen on wool. Before being woven into fabrics silk is commonly weighted with tin and iron with which it forms staple chemical compounds. Weighted silk subjected to the action of Bunsen flame parts with its organic

constituent but retains its structural appearance. Silk is very subject to adulteration with other fibres, and to complete substitution by artifioial preparations. One form of artificial silk invented in 1884 is made from prepared cotton or wood fibre. It possesses a very silky lustre and was at first very inflammable and even explosive, being practically nitrocellulose, but later the product was subjected to chemical process and made harmless. Another form is made from cotton waste and is produced much more cheaply. Still another form is made from gelatine at an expense of about a dollar and fifteen cents per pound. It has a low tensile strength but may be employed in the mixture with general silk or fine linen or cotton thread to make a durable fabric.

Silk is used chiefly in the manufacture of silks, satin, velvet, crape and plush.

ADULTERATION OF CLOTHING.

Fabrics are much subject to adulteration by admixture of fibres of lower value, as of cotton or shoddy to wool, and by starch and mineral matters to give weight. Many of the cheapest cotton fabrics are so heavily sized that a single washing will convert a stiff apparently close wove piece of goods into a worthless, coarse, flimsy material fit only for sieves.

SELECTION OF CLOTHING.

The properties of the various materials used in the manufacture of textiles have already been given to some detail; and further consideration of underclothing and outer garments beyond a

word of caution against unnecessary weight of clothing and undue constriction of any part of the body as therefore unnecessary. In the matter of constriction no part of the human body is so abused as the foot; especially that of women. Boots, shoes and stockings should fit the foot, and there should be no such thing as the agony which many people suffer as a matter of course, in the process of breaking in. The toe should be neither pointed nor cut square, and the whole sole should follow the natural outline of the foot. The sole should project a reasonable distance from the upper in order to give firmer support and increase protection to the soft parts from contact with loose stones and other objects. The heel should be low and broad. High heels are worn not for comfort in walking, but to increase the height of the body and diminish the apparent length of the foot. For purposes of successful deception they take about equal rank with hair dyes and artificial complexions. Their use conduces to weakness of the arch atrophy of the muscles of the leg, and a variety of other abnormalities.

The heel of the foot should fit snugly within the shoe but the toe should have sufficient room for freedom of movement; yet not enough to cause chafing and excoreations; the uppers should fit snugly but not too tightly about the ankle and over the instep. Otherwise the foot will drive forward and cramp the toes."

CHAPTER V.

BACTERIOLOGY.

It has only been for twenty-five or thirty years that this science has been developing. As the name implies, it is the science of minute organisms, and is chiefly of interest from the effects that the organisms have upon the human body in the production of disease.

All infectious diseases are undoubtedly produced by low organisms, although they have not all been clearly demonstrated or made out. The diseases in which the organisms have not been found behave so nearly like those in which they have been found that there can be no doubt that micro-organisms are the cause of all infectious diseases. Those that have been demonstrated clearly each have peculiar life histories different from the others. each have different forms from the others, and in most instances by injecting them into lower animals the disease can be produced in the lower animals identical with that of man. They can be cultivated on a number of media. Some of them are easily cultivated; others with more difficulty. Some of them grow well on gelatine; some on beef broth or bouillon, and agaragar. I thought it proper here to give a short sketch of the characteristics of some of the most prominent pathogenic organisms.

THE STAPHYLOCCOCUS PYOGENES AUREUS.

This organism is the organism that produces pus or common matter found in abcesses. They are round or bug-shaped; they are easily cultivated; they stain readily; they grow on a potato luxuriously; they are nonmotile; they are the most common pathogenic organism known to the physician or surgeon.

BACILLUS PYOCYANEUS (BACILLUS OR GREEN PUS

This bacillus is concerned in the production of green pus or blue green pus. It is a delicate rod with rounded or pointed ends. It moves actively and it does not form spores. It grows readily on all artificial media, and gives to some of them a bright green color most conspicuous where it is in contact with air.

BACILLUS OF BUBONIC PLAGUE.

This organism is a short and oval bacillus. It stains more readily at the ends than at the center and is nonsporeforming, and nonmotile.

This organism produces a disease with a very high rate of mortality and from history is evidently the disease that went under the name of Plague and Black Death which destroyed millions of people in the middle ages, all over the East.

BACILLUS TUBERCULOSIS.

This organism is a delicate beaded rod that is exceedingly small and hard to kill, and hard to stain, and is the organism that causes consumption of the lungs which is so destructive to the human

race. Experimentally tuberculosis may be produced in all susceptible animals by the injection of tuberclebacilli or their spores. Some animals are immune from this disease; all experiments having failed to produce the disease. Undoubtedly in the human subject the chief avenue through which the bacillus tuberculosis enters is by way of the air passages. It may be produced through wounds through the skin, or it may be introduced by food, as the eating of tuberculous food. When they are inhaled into the lungs if they find a favorable site for development they grow and multiply. Their preference in the lungs is the upper part evidently the most unventilated part of the lung.

TUBERCULIN.

Tuberculin is the product of old cultures of the tuberclebacillus strained. It was once thought that it would prove a cure for tuberculosis, and was used extensively in hospitals, but proved a failure. It is however an interesting substance. When injected into a man or animals suffering from tuberculosis it produces a marked reaction. It elevates the temperature in a very short time, and produces a degree of inflammation around tuberculous sites, but in healthy animals or healthy persons it produces no effect as far as can be determined.

BACILLUS INFLUENZA.

It is a very small, slender non-spore forming organism. It is nonmotile. It can be stained with a number of stains. It does not develop well except at temperatures near that of the human

body. It is the organism that produces influenza; sometimes called catarrhal fever; sometimes called lagrippe.

In the influenza patient it is found in the sputa and in the nasal secretions, and also in the tissues of the body in persons dead of the disease.

BACILLUS OF DIPHTHERIA.

This organism varies somewhat in appearances owing to its method of staining. It is a very small rod with rounded ends. It can be obtained from the false membrane that forms on the throat of those suffering from the disease. When injected into the lower animals the disease can be produced in a number of the lower animals at the point of injection. It grows on a number of media. It is easily killed by a number of antiseptic substances. Its most favorable temperature for cultivation is something near that of the human body.

BACILLUS OF TYPHOID FEVER.

This bacillus is regarded as the cause of typhoid fever. It is about three times as long as thick, with rounded ends. It is very actively motile. There is a method of staining of it that shows feet like processes. It grows best at a temperature near that of the human body.

In patients suffering from typhoid fever the organism has been found during life in the blood, urine, and feces, and in those dead of the disease the spleen, kidney, liver, intestinal lymphatic glands, and intestines. It is cultivated largely from the discharges. Typhoid fever has been

produced in some of the lower animals by the injection of this organism.

A very peculiar effect is produced on this organism when brought in contact with the serum of the blood of a patient suffering from typhoid fever. The organism is actively motile, and if the serum of a drop of blood be taken from a typhoid patient and added to a drop of fluid containing the bacilli, the bacilli will be seen to gradually cease to move. This is called the widal reaction.

THE SPIRILLUM OF ASIATIC CHOLERA.

This organism is an exceedingly small organism and is curved like a comma, and sometimes called the comma-bacillus. It is actively motile. It is found in the discharges of cholera patients, and is undoubtedly the organism that produces that disease. It too, is most easily cultivated at a temperature approaching that of the human body. It multiplies with exceeding rapidity, and is found in great abundance in the diarrheal discharges of cholera. It is very sensative to high temperatures and it is killed before the water reaches the boiling point. The disease has been produced on lower animals by various methods.

BACILLUS ANTHRACIS.

This organism is one of considerable interest; being larger than the most of organisms. Its life history has been very definitely ascertained. It is the organism that produces murrain in cattle. It is a rod shaped organism with square cut ends. It is most easily cultivated at a temperature of the human body. It multiplies by the formation

of spores, and can be produced in various other animals artificially.

BACILLUS OF TETANUS OR LOCKJAW.

This is a slender rod with rounded ends. It is motile; but not actively so. At the temperature of the body it rapidly forms spores. It stains by a number of methods, and the disease can be transferred from one animal to another by injection.

CLINICAL HISTORY OF SOME OF THE MOST COMMON DISEASES.

As disease is something that concerns everybody it appears well that the people should be enlightened as much as possible about it. I will here give a short description of some of the most common diseases to which the human body is liable.

PULMONARY TUBERCULOSIS.

In this article I will describe the acute and subacute forms of the disease, and then the chronic form. The disease is often very insidious in its development. In some cases the lung symptoms are preceded weeks or months by a general decline in health, noted by the loss of weight, impaired strength, and a pallid aspect. These premonitions are not seen in every case, and where they exist are not always sufficiently marked to excite the attention of the patient. In a considerable number of cases the pulmonary symptoms are not accompanied by any ailments that lead the patient to suspect the existence of any disease. In a large number of cases when the patient comes under the care of the physician the disease has existed for a

considerable while. Of the pulmonary symptoms at first that excite attention one of the chief is cough. It is often very slight at first, dry and hacking, and sometimes excites no attention. Expectoration is wanting at first in many cases, but as the disease advances the patient expectorates froth with small hard lumps in it.

Spitting of blood is a common sympton in the early stages. The amount is small in a large majority of cases. Pain in the chest is very commonly complained of, and the patient usually complains of a sore chest. The pain is often sharp and lancinating or stitch like, and is generally referred to the summit of the chest.

The disease nearly always begins on one side, at the top of the lung; and after it advances considerably the other lung becomes involved. The patient is usually pale, with flushes on the cheeks at times. During the first stage of the disease the pulse are usually accelerated. This is generally in proportion to the activity of the disease. Where the pulse are very frequent in the early stages of the disease, it indicates a rapid course of the disease. In the acute form of the disease the temperature is more or less always elevated in the first stages of the disease. The increase in temperature is more or less an index to the progress of the disease. The temperature is usually higher of an evening than morning. The pulse also are usually accelerated more of an evening than of morning. The patient usually complains of chilly sensations, and as the disease advances sometimes has chills.

The appetite is variable; generally is more or less weakened. The ability to digest food is gener-

ally impaired, and in some cases there is an entire loss of appetite. This is a very unfavorable feature of the disease.

In some cases there is a diarrhea in the first stage of the disease. Impaired nutrition is frequently one of the earliest symptoms. As a rule reduction in weight is continuous as long as the disease is active; and when patients gain in weight the disease may be considered as non-progressive. The intellectual faculties are usually unimpaired. Patients are generally very cheerful. As the disease advances all the symptoms mentioned become more severe.

Many cases are affected by co-existing affections. The occurrence of tuberculous disease in intestines or of the larynx or of the kidneys, and a chronic peritonitis sometimes complicates the case. The duration of the disease varies greatly. The acute and sub-acute varieties of which I am now treating usually live from six months to two years; but sometimes the disease runs a rapid course and proves fatal in two or three months or even less time. Sometimes even in these acute cases the patient will improve for a short while, put on weight and gain a good appetite; but this usually does not last long. Near the close of the disease the patient becomes amaciated to an extreme degree. The old authors attributed this disease to a hereditary predisposition; but it has been found that the cause of the disease is the bacillus tuberculosis; although the constitution has to be in a suitable condition before the disease will develop. As constitutions are generally inherited, those of a weak constitution are the ones that are prone to suffer from the disease.

The period of life in which the disease is most often found is from 18 to 35 years, 'though it is frequently seen even in the aged.

While many hold that many cases of this disease can be cured I am doubtful if any cases of acute tuberculosis ever get well. By proper dieting and good hygiene, life may be prolonged, but to affect a permanent cure I am very doubtful.

CHAPTER VI.

HYGIENE AND NURSING.

The patient should have his digestion improved and be nourished with good nourishing diet; take exercise as much as he is able when the weather is good, and in the more favorable cases he may be sent to a dry high climate. The patient should sleep in a well ventilated room, but in cold damp weather the room should be kept warm and dry. Just inhaling the cold air lowers the vitality of the lungs, and often gives the patient cold, and is to a disadvantage. Over-exercise has to be avoided, patients sometimes think that the benefits from exercise is proportionate to the amount, they greatly overdo themselves.

Horseback exercise is to be preferred when foot exercise is not well borne. The body should be protected against the changes in atmosphere by yarn underclothing, and the clothing should be proportioned to the temperature. Persons endowed with resolution and energy; other things being equal; are more likely to struggle successfully with the disease than those who are deficient in these qualities.

CHANGE OF CLIMATE.

The patient having been made aware of the nature of his disease, the next question is—shall he change climates. In certain cases change of climate in

the acute form of the disease, will no doubt prolong life. In the earliest stages of the disease will be the time to make the change. After the disease has advanced and the patient is bedridden he would be better off at home.

The climates most suited for tuberculous patients are those that have a large amount of dry weather. For winter time, warm climate. A high climate that has a heap of dry weather and little or no fogs, and not subject to much change, is the most suitable for patients suffering from pulmonary tuberculosis. Arizona or New Mexico are about the best in the United States,

CHRONIC PULMONARY TUBERCULOSIS.

This form of tuberculosis develops very slowly, and nature makes a considerable effort to cure. In the early stages of the disease while the patient has a cough, and sometimes hemorrhage. The patient has no fever, and little or no acceleration of pulse. Like the acute form of the disease, it begins in the upper part of the lungs, and the tissues often throw a wall around the tuberculous deposits. The deposits sometimes break down and are expectorated, leaving secreting cavities. This form of the disease may exist almost an indefinite time without any notable amaciation, and even the patient may live many years and die from some other disease. Of course this is the most favorable termination. The hygienic treatment is of very great importance in this disease. The digestion should be kept in good condition, and the body nourished to the fullest extent, and the patient take a good amount of exercise by

walking and riding on horseback, and in the early stages it is often highly useful to go to a high, dry and warm climate.

PNEUMONIA.

In the vast majority of cases this disease is ushered in by a chill. Quick strong pulse with a high temperature; flushed face, and extremely rapid breathing a dull pain in the chest, with a cough, and very generally a rusty colored expectoration; the color being owing to the intimate mixture of blood with the sputa. This rusty sputa is characteristics of pneumonia. Some cases run their course without it, but typical cases not often. The expectoration is sometimes like prune juice. The patient breathes from forty to eighty times a minute in many cases. Headache is very common. Delirium is not very common, but when it does occur it is of ill omen. The urine is high colored and that of fever.

The part of the lungs that are involved becomes solidified and excludes the air from the part of the lung involved. One lobe only may be affected, or one on either side may be affected, constituting a double pneumonia; or all of one side may be affected, and the severity of the disease is more or less proportionate to the amount of lung involved aside from the disease in the aged in whom all forms of it are severe, and very generally fatal.

This disease pursues a very rapid course and terminates in from six to ten days in a crisis, should the patient withstand it. It always has more or less a high temperature, ranging from 103 to 105 fahrenheit. When it terminates it is very generally abruptly.

Respecting the nursing in this disease, the patient should be placed in a good airy room and not allowed to get out of bed. and in severe cases, not even to raise his head.

An exceedingly light diet is suitable during the height of the disease. Animal broths, milk and buttermilk, with cooling drinks, such as lemonade, is about all the patient needs in the way of eating and drinking until he becomes convalescent In convalescence the diet may be more liberal, such as soft eggs, tender chicken, and other light diets may be added. During fever the patient should be allowed plenty of water.

TYPHOID-FEVER.

This fever approaches more slowly than any other belonging to the types of fever. It is ushered in by a loss of appetite, misery in the limbs, general indisposition and a gradual rise of temperature. As a very general rule rising a degree higher of an evening than that of a morning; going a little higher every day until the second or third week. The patient generally complains of soreness in his limbs, and very easily fatigued, and headache. His sleep is unsound, and his nervous energies are weakened. He often has slight chilly sensations which alternate with flushes of heat. His appetite is entirely gone, his tongue is coated, and in all but the very mildest cases a diarrhea sets in the first, second or third week. The tongue is usually dry; sometimes parched, and is often glazed; sometimes it has deep fissures in it. The gums and teeth are frequently colored with a dark crust; the mind is dull and wondering. As the disease advances in severe

cases, the patient often becomes delirious. The pulse is accelerated as a rule more or less, in proportion to the height of the fever. The urine of the fever is of high color. Diarrhea is always a prominent symptom in the latter part of severe cases. It is never absent except in very mild cases. Generally it is a very early symptom. Its cause is undoubtedly due to the ulcers on the bowels, and is a conservative process set up by nature to get rid of the poisons engendered by the micro-organisms feeding on the bowels. The bacilli of typhoid can be obtained from this diarrheal discharge. The rub with the patient is usually in the fourth week. He is now weakened greatly for want of nourishment, and in no other disease will one get so low as in typhoid, and yet recover. The decline of the fever in favorable cases usually begins in the fourth week, and declines rather slowly. When the fever ends great care should be exercised in the selection of a suitable diet. The patient is not yet out of danger. Even weeks after the end of the fever patients have died from an error in diet. When the patient is known to suffer from typhoid it is very desirable to have an intelligent nurse to nurse him. He should be placed in a well ventilated room and kept as quiet as possible, and not allowed to weary, and visitors as a rule should be excluded from the room. He should have plenty of good cooling drinks, such as lemonade and ice water. The diet should consist of buttermilk partially sour, and chicken broth, to the end of the disease. I have often found sweet milk to disagree and pass undigested.

In convalescence it has been a question how

long the patient should be kept on a fluid diet. I think at least ten days, and when solid food is given, very small quantities should be given, and the amount gradually increased.

INTERMITENT FEVER.

The Paroxysm is ushered in by a chill, the face becomes pale, the lips bluish, the teeth chatter, the skin is cold, and there is a feeling of uneasiness and fatigue. After a period variating from a half to one hour, this cold stage passes off. Now, a fever begins to rise with restlessness, thirst, a rapid pulse, pains in the muscles, and scanty secretions of urine. This stage continues for hours, then a sweat usually breaks out on the body. the pulse becomes soft and less frequent, the secretions are re-established and this sweating stage terminates the paroxysm. The patient is now, for the time being, well, but in from twenty-four to 70 hours the paroxysm repeats itself.

In the former case, the fever is called a Quotidian, in the latter, Quartan. The name Tertian Type is applied to this disease, when the chills occur at intervals of forty-eight hours, but in the occurrence of the chill, there are some irregularities in some cases. The varied types of the fever have a marked difference in the character and duration of their several stages. Thus, a sweating stage may precede the cold stage, when in some cases it may be the only one that shows itself, and in other cases, the rigor may be wanted. Sometimes there are no distinct stages, the patient is then said to have dumb ague; this is manifested by feelings of great depression. These cases are often

accompanied by headache nausea and vomiting and painful sensations in various parts of the body. In cases of this kind, it is often difficult to clear the diagnosis from other diseases. This can only be done by getting at the history of the case, and periodical nature of the disease. This disease is produced by a micro-organism called the Plasmodium Malaria, that assumes an active stage periodically. There is no doubt that there is several species of the organism. The care of the patient consists in his resting in bed during the existence of the paroxysm. The bowels should be free, with some active purgative and large doses of sulphate of quinine administered two or three times per day till the paroxysm cease to recur. From ten to twenty grains of quinine may be given to an adult two or three times per day. This, with the proper attention to the appetite comprises the treatment.

REMITTENT FEVER.

Remittent fever has no well-defined symptoms. The disease generally begins with a chill succeeded by fever, and after a varying period the fever declines but does not intermit, and again rises. The patient has pain and throbbing in the head, and is generally very restless, his limbs ache, and his tongue is coated; he is thirsty, and he often vomits. After the fever continues for an indefinite time it again remits. He often sweats at intervals. He sometimes becomes composed and cheerful, his head ceases to ache, but again this lull does not last but a few hours. Fever rises again, pulse is full, frequent and hard. With the sweating stage

the fever declines, usually several degrees, soon to rise again, and there is a fall or remission again with another quick rise which sometimes attain a very high point; even to 105 and 107 degrees. The greatest height is usually reached from the third to the fifth day. After this the remissions are usually less distinct and can only be recognized by the use of the thermometer. When the fever ceases temperature usually falls below the normal. The duration of the fever is generally from ten to twelve days.

The urine in remittent fever is high colored and has a large amount of solids. The disease is very readily recognized by the experienced physician Its characteristic symptoms are more closely allied with those of intermittent fever than perhaps any other disease.

In intermittent fever each paroxysm begins with a chill, which is not the case in remittent fever after the first paroxysm there is not often any more, and this one is not so violent as in intermittent.

In regard to the nursing, the patient should be placed in a good airy room and allowed cold drinks and a light diet, such as sour buttermilk, animal broth, etc. and that comprises the diet.

YELLOW FEVER.

This fever takes its name from the color the skin assumes in the progress of the disease. It is a disease peculiar to hot climates. It is undoubtedly due to a micro-organism, and is no doubt sometimes conveyed by the mosquito. It is a disease of very short duration; many die before the fifth day of the disease. It has but one paroxysm which is

usually divided into three stages. The first stage is pre-eminently the febrile stage. Its duration is from 36 to 48 hours. The onset is usually very sudden, and begins with a chill; and in desperate cases death takes place before reaction occurs. More generally the chill is followed by febrile excitement. The patient has a high fever, the pulse is quick, the face is flushed, the eyes are brilliantly injected. The patient is usually conscious, restless and anxious, and complains much of pains in his head and limbs. His muscles of his extremities are sore, his respiration is hurried, his stomach is irritable and painful on pressure, and he is usually very thirsty. His bowels are constipated, his tongue is coated 'though not dry. Sometimes the tongue remains natural throughout the disease. The fever rises toward evening and falls of a morning. 'though it does not distinctly remit until from thirty-six to forty-eight hours when remission occurs.

The disease now appears in its second stage; the fever subsides; the pulse improves in character; the headache is relieved; the temperature declines to near the normal. Now the eyes turn of a deep yellow and the skin is more or less jaundiced over the body. The patient becomes cheerful, and often wishes to get up. In some cases convalescence begins and he slowly gets well; but more generally the disease is not at its end. The deceptive improvement hardly ever lasts more than a day. The patient grows again very uncomfortable and anxious. Symptoms of the first stage reappear with increased intensity. The pulse sink and becomes slow. The skin is cool, dry, and in some cases of a bronze hue.

Livid spots sometimes make their appearance at this stage of the disease. The patient's stomach is very irritable and he frequently vomits. Sometimes a black vomit, which is due to a hemorrhage of the stomach. Delirium now frequently sets in and the patient sinks frequently. In some cases the mind remains clear almost to the last, and the strength even be but little impaired. Should recovery take place it is very slowly. The disease does not appear in every epidemic with the same severity. Some epidemics run a mild course; whereas in other epidemics about half the patients die.

The more rapidly the stages succeed each other the more dangerous is the disease. The occurrence of black vomit, suppression of urine, delirium, and of oppressed breathing, or of convulsions and fiery glistening eyes are very unfavorable symptoms. The maximum elevation of temperature in yellow fever is attained upon the first, second or third days, and ranges from about 102 to 110. degrees

A rapid rise of temperature has an ill significance. Of late years a number of experiments have been made with the mosquito, and beyond a doubt it is proven that they transfer the disease; at least in some instances from one to another. One noted physician in experimenting on himself allowed a mosquito to bite him, which had bitten a patient suffering from the disease, and took yellow fever himself and died with it.

Respecting the diet in this disease, the very lightest diet is most suitable. Fluid diet is to be preferred, such as milk and animal broths, and the patient kept perfectly quiet and free from annoyances in a well ventilated room.

CEREBRO SPINAL MENINGITIS.

This disease is often called cerebro spinal fever and epidemic meningitis. The disease appears sometimes in isolated cases, and sometimes in an epidemic form. It does not always present the same symptoms. The onset in the vast majority of cases is rather abruptly. The approach is ushered in by chilly sensations, headache, and tenderness of the muscles of the back of the neck. Some times the patient vomits. The severe headache is often associated with vertigo and sometimes delirium and stupor.

A symptom that is more or less always present is stiffness of the neck. In very severe cases this may extend to the lower extremities so the patient may be lifted to his feet by his head. The head is usually thrown back and rigidly fixed. The face of the patient is that of suffering and he is generally very restless. He trembles and talks incoherently; the pupils of his eyes are generally dilated. There is usually dimness of vision, and sometimes double vision. The skin is dry and very sensitive. The surface of the skin frequently looks spotted with a reddish eruption; it sometimes becomes of a brownish character.

The pulse at first may be either natural or slow; usually it becomes frequent, and sometimes irregular. The pulse usually remain accelerated throughout the disease, 'though it shows considerableo variations as to acceleration during a few hours. The tongue may be moist, dry or brown. The breathing is often shallow and somewhat accelerated. The bowels are often at the outset constipated, but

as the disease advances they often become lax. The stomach is somewhat irritable; the patient is thirsty and often has convulsive movements of the extremities. With these symptoms the disease goes on to its close, presenting sometimes remissions that would lead one to believe that the patient was convalescent.

In the fortunate cases the symptoms gradually lose their violence and the patient very much amaciated enters upon convalescence. The temperature varies greatly in different cases. Occasionally at the outset there is no fever; but sooner or later the temperature becomes elevated; but in fatal cases it often does not run very high; but in some cases runs as high as from 108 to 110 degrees fahrinheit. The duration of the disease is very various. The patients often die in three or four days and sometimes in less than 24 hours. Sometimes they may live weeks and then die from the disease.

As to the cause of the disease it belongs to the infectious diseases, and recently a germ has been found. Children are most frequently victims of the disease 'though grown people have it also. It is more common in winter and spring than it is in summer.

This disease is one of the most fatal of children's diseases. A fair average mortality would be from 60 to 80 per cent. As regards the nursing it does not differ from other severe fevers.

ACUTE RHEUMATISM.

Acute rheumatism is now regarded by most authorities as produced by a micro-organism. It is a disease of the joints; the larger ones being

chiefly affected. The joints swell and become red and tender. They are the seat of considerable pain. It is considerbly aggravated by movement. The inflammation may remain confined to the joints first affected until the disease terminates, but very much more common it shifts from one joint to another, involving most of the large joints in succession. The disease is ushered in and accompanied by a high fever and a full bounding pulse. The perspiration is usually sour. The tongue is coated and the countenance is one of suffering. The fever is often in proportion to the number of joints involved. The temperature ranges from 102 to 104, and generally remains steady to the end of the disease, with slight morning remissions. As the disease disappears the temperature gradually subsides. When the disease is well developed it is not difficult to recognize it. Pains in the joints, the swelling and tenderness, the shifting character from one joint to another, the fever, the sour perspiration, form a group of symptoms that is highly characteristic.

As to the nursing, the patient should be kept perfectly quiet, be fed a light diet, such as milk and animal broth.

APPENDICITIS.

Appendicitis is an inflammation of the appendix. The appendix is a little blind ended organ attached to the head of the large bowel. It is about the size of a goose quill as a rule, and three or four inches long. It lies on the right side, and unless anchored by adhesions it is free to move about. The disease to which it is subject is appendicitis.

The lumen of the tube admits of small particles of waste products in the bowels to get out in it, and sometimes seeds find their way into it and have been thought to have something to do with causing the disease. The symptoms of appendicitis are pain and tenderness in the region of the appendix. A hard roll or mass can often be felt when the abdominal muscles are relaxed. There is more or less always some elevation of temperature. The fever varies in different cases. In severe cases the temperature is not always very high. The pulse are usually accelerated, and the bowels constipated.

The patient's appetite is poor and he is generally thirsty. Now there are several ways in which appendicitis may terminate. It may terminate first by the inflammation subsiding and the patient's recovery; or it may become gangrenous and slough off, and the contents of the bowels escape into the abdominal cavity and set up peritonitis with a fatal result; or it may terminate in pus formation and by adhesions be walled off from the cavity of the abdomen. This pus formation may rupture in the abdominal cavity and set up peritonitis. The majority of the cases terminate in resolution under proper management; that is, the inflammation subsides without terminating in gangrene or pus formation. There is hardly any disease known that has been more discussed of late years than that of appendicitis. Prior to 16 or 18 years ago it was treated medically altogether, but now it is considered partly a medical and partly a surgical disease; although there are a large number of surgeons regard it as a surgical disease, while

there is another class of surgeons who are more conservative in their views regard it as both a medical and surgical disease. There has been volumes and volumes written upon it for the last few years, and thousands have had their appendix removed, and still the question cannot be settled as to whether all cases should be operated upon or not. A great many surgeons advocate removing of it at once; as soon as the diagnosis is made, while others equally as eminent only operate in selected cases. Both claim the best results and the question is still unsettled.

Those who once have the disease seem to be very liable to subsequent attacks. When operated on very early the mortality is rather low; but often the surgeon does not see the case until the disease is considerably advanced, and in the mild cases many will not subject themselves to an operation. Under proper treatment without the use of the knife it is likely that 80 or 90 per cent. at least will recover, or perhaps more. It is often a little difficult to make a clear diagnosis, and there can be no doubt that many are operated on that have no appendicitis. Upon the whole I am with the conservative view myself. In mild cases in whom there is no dangerous symptoms I would treat the case medically; but should the case progress for the worse after a fair trial of medical procedures, I would advise an operation. It is just a little hard for to tell what cases are most suitable for operation. Of course in cases of pus formation the patient should be operated upon, but it is not always possible to tell when pus is forming, or to tell when the appendix has become gangrenous.

If these points could be made clear in every case I think there would not be so much difference of opinion as to when an operation is indicated.

DIPHTHERIA.

Diphtheria begins with a sore throat, with redness and swelling of the palate and tonsils. There is a slight stiffness of the neck as a rule, and the little glands in the back of the neck and the glands under the jaws are often enlarged and tender. Within the course of a day or so there is a membrane form on the tonsils and the palate. It is of a white or grayish hue and generally tough. It may extend into the windpipe or into the nostrils. The membrane once formed gradually darkens and assumes rather a dirty appearance. After the first week from the beginning the membrane is not apt to reform; but in the early stages if it is removed in any way it reforms for the most part rapidly. The constitutional symptoms vary greatly. The pulse are usually frequent, the skin hot, and there is much pain in the head. In fact the symptoms are those of fever. The temperature usually ranges from 102 to 104, 'though this varies considerably in some of the worst cases, and the temperature is low; nearly normal. The patient is greatly prostrated from the beginning of the disease. In some cases a typhoid condition develops. This often happens when the membrane decomposes and gives rise to offensive odors, and is often called septic forms of the disease. In such cases the temperature is always low.

In diphtheria the danger arises partly from the depressing effect of the poison which is caused by

the poison gaining access to the circulation. The poison is evidently produced by the germs in their multiplication and development, and it is said that exceedingly small amounts of it will prove fatal when injected into lower animals. Another danger is that the disease may extend into the windpipe and suffocate the patient, and in other instances heart failure is the immediate cause of death. Sometimes the disease appears in a very severe form, and is accompanied by a high mortality, and in other epidemics it appears in a mild form.

In regard to the nursing, as soon as the disease is made out the patient should be kept in an isolated room; the eating utensils should be sterilized with boiling water; the patient should be kept perfectly quiet, and in bad cases should not be allowed to get out of bed. Persons convalescing from this disease and thought to be out of danger, by a little exertion has caused heart failure and immediate death. Most authorities recommend a liberal diet; that is, rather a rich diet, but in severe cases it is very doubtful that a rich diet proves of any use, as the system is often unable to digest it. Where the appetite is fair the patient may be allowed a liberal diet of good nourishing food, but when the appetite is wanting, milk and broth is probably superior to any other.

SCARLET-FEVER.

For the most part scarlet fever is met with among children, 'though sometimes adults have the disease. It is characterized by great heat of skin, frequent pulse, sore throat, and a scarlet eruption.

The skin is very hot and generally dry, and the pulse so frequent that by these signs alone, in the midst of an epidemic the physician may be able to make a diagnosis. The temperature does not fall with the appearance of the eruption but continues high until the eruption is fairly developed, and it slowly declines as the eruption does. The rash usually appears on the second day of the disease. It comes out almost simultaneously all over the body. At first the surface exhibits almost a uniform red blush, which will on pressure to some extent disappear. In other words, the pressure leaves a white stain on the skin which quickly again reddens on removal of the pressure. The eruption declines on the fourth or fifth day. By the seventh or the eighth the cuticle begins to come away in scales. Occasionally the rash, when at its height, recedes and then appears again. In malignant cases it makes its appearance late, and is usually dark and livid in appearance.

In some instances it is wanting altogether. The sore throat of scarlet fever is very characteristic of the scarlet rash. It develops early in the disease; before the eruption. At the beginning sore throat consists of redness of the tonsils and the palate. The tonsils are generally swollen. The patient complains of pain in his throat. There is also some stiffness of the muscles of the neck. The glands of the jaw become much swollen, and sometimes pressing on the vessels of the neck will produce a stupor. This is considered a grave symptom. There is a false membrane develops on the tonsils, which in many cases resembles diphtheria. The tongue has a peculiar appearance.

At first it is thickly coated; the borders being red; pretty soon the coat is cast off and the whole organ looks red like a strawberry. In bad cases the tongue sometimes becomes very dry and assumes a brownish hue. In children the disease is sometimes ushered in by convulsions. There is a great deal of difference in different epidemics of the disease. Some are very severe, accompanied with considerable mortality, while in other epidemics the disease is quite mild and all get well. Scarlet fever being a contagious disease, the cases should be separated from other children, and when the patient gets well, as the scales are left on the bed clothing, the bed clothing should be subjected to thorough scalding. Nursing is the chief remedy in this disease. The patient should be confined to bed in a good airy room and fed on a light fluid diet.

MEASLES.

Measles begin the attack by fever, frequent sneezing, considerable flow from the nose, the patient coughs, and at first the disease resembles acute catarrh or cold. To these symptoms in many instances a diarrhea is added. On about the fourth day after the beginning of these morbid signs a rash appears on the face and neck first, then it extends in the coarse of a day or two to the whole body. During the first day of the disease the temperature as a rule goes up to 102 to 104 degrees. On the second or third day; usually the second, the temperature goes down near the normal. About the fourth day it rises again. The occurrence of the rash does not remove the febrile symptoms.

While it is spreading to the lower extremities the constitutional disturbance lasts and the temperature remains high. As soon as the rash has reached its height the temperature rapidly falls. By the ninth day of the disease, as a rule, the rash and the fever are absent. As a rule the cuticle comes away in fine scales with a severe itching. The patient now convalescent, shows his illness, and is rather pale and amaciated. He still coughs, and his eyes are slightly inflamed.

The peculiarities of the eruption is that it consists of slightly raised red spots which coalesce and form blotches of an irregular crescentic shape. The eruption disappears from the face first; in other words it disappears in the order of its appearance.

Measles is a contagious disease and the cases should be isolated and the patient kept in the house and at rest; the diet should be light, and the bedding subjected to scalding after the recovery of the patient.

GERMAN MEASLES OR RUBELLA.

German measles is sometimes called Rubella, is a different disease to ordinary measles, and one does not protect against the other. The disease begins by fever, chill, accompanied by running at the nose, cough and sore throat. The fever before the eruption lasts two or three days. The temperature rarely exceeds 102 degrees; the rash may appear all over the body at once, or in course of a day spread all over the body. It often appears on the face first and is usualy most distinct on the face and neck; being more scattered on the rest of the body. At first it resembles ordinary meas-

les very much, but the spots are round or oval and smaller and paler than they are in measles. They soon run together in irregular patches unlike the crescentic eruption of measles.

The patches vary very much in size, and unlike the rash of scarlet fever are surrounded by healthy skin. The small spots appear around the large ones. They have the deepest color in the center, but not bright colored as they are in measles nor of the dark red of scarlet fever. The eruption usually lasts four or five days, but in severe cases it lasts eight or ten days. It gradually fades. It sometimes fades on the face before it has fairly come out on the legs. The scales are very small; being much smaller than those of scarlet fever. The rash is often attended with considerable itching. The sore throat and catarrh may be very severe, and is usually attended with hoarseness and sometimes inability to swallow.

The disease is sometimes very difficult to distinguish from measles, except when it is epidemic or affects those who have already had ordinary measles. The more certain onset with a milder fever, and the peculiarities of the eruption already spoken of are the only guides to distinguish between them.

The disease is a contagious one. The patients should remain in the house and be isolated from others. As to the hygienic management, it should be the same as in ordinary measles.

It might be stated here that all these eruptive fevers like measles, German Measles and Scarlet Fever, require care in regard to getting the body wet. The patient should not be exposed to a very damp atmosphere even, until he is fairly well.

Consequently patients should be kept in doors until they get well.

SMALL-POX OR VARIOLA.

Small-pox is one of the most contagious of diseases. The symptoms of the first stage or the stage of invasion are chills, fever and pains in the back. The fever is sometimes very high, but in mild cases it is usually low. Pain in the back in severe cases is very severe. Sometimes the pains in the limbs resemble rheumatism. The patient is often sick at his stomach—sometimes vomits, and he has a headache, and is generally restless. As the eruption appears these symptoms subside, which is usually on the third or fourth day of the disease. The eruption appears on the forehead and face first, and soon extends to the body and extremities; and as the eruption appears the temperature falls.

At first the eruption has the appearance of papules, but in two or three days these spots undergo a decided change. On the top of each papule a vesicle forms, which becomes larger and fills up with a thick milky fluid; or in other words the vesicle is converted into a pustule. By the fifth or sixth day this change is complete. The pustule now loses its umbilicated appearance it had while forming. On the eighth or ninth day matter begins to ooze from the edges of the pustule. Now a secondary fever sets in and lasts for three or four days, or until all the pustules are broken. This secondary fever is often ushered in by a chill. The temperature ranges from 103 to 105 degrees. By the time it subsides crusts form, where before there

have been pustules, and as these crusts dry and fall off the skin beneath is of a red color which only very gradually fades, and here and there are noticed those scars and pits which the patient carries for the rest of his lifetime. When these pustules are fully developed they harden at their base so they feel like shot under the skin.

The disease varies in different epidemics; sometimes it is severe with considerable mortality, and sometimes it is mild and they all get well. The chief treatment is good nursing. There is no medicine that has any influence over the course of the disease.

The patient should be kept in a well ventilated room, completely; fed on a light diet, and the bedding burned or subjected to scalding and the room thoroughly disinfected after the patient gets well.

ERYSIPELAS.

Erysipelas might be regarded as an eruptive fever, usually beginning with a chill. The part affected is red, swollen and hot, and the redness spreads a clearly defined edge marking of its boundaries; and generally if it is located on the face it will go over the chief part of the head. The patient is very restless; has a high fever; the glands at the angle of the jaws are swollen and the throat is sore. In about a week the fever disappears and the swelling and inflammation subsides. In milder cases this is the termination, but sometimes the affection extends and frequently involves the true skin and forms pus. In some cases the inflammation extends to the brain; then we have violent delirium and the patient sinks rapidly. Occasion-

ally the disease gets into the throat, and even reaches the bronchial tubes and places the patient in a perilous condition.

The nursing requires the patient to rest in bed; to be fed on a light diet until the disease is over.

SCABIES OR ITCH.

Scabies is owing to a parasite that gets under the cuticle and travels around and produces the itching. Usually the parasite first attacks the fingers and thence travels to various parts of the body. The channels produced are generally somewhat curved and may be traced as whitish but more generally black streaks. The disease is attended with an excessive itching which is worse at night, and with an eruption of the conical vesicles. The disease is often accompanied by a rash due to the scratching.

It is said that balsam of peru is a positive remedy for it. It should be applied once a day wherever the parasite is found.

SYPHILIS.

Syphilis is a specific disease resulting from the inoculation of a specific germ which multiplies in the system until the whole body is infected. It is communicated by direct contact of the blood, secretions, or discharges of a person suffering from the disease, and under certain circumstances it is transmitted from syphilitic parents to their offspring. Syphilis is divided into acquired and inherited syphilis. In the acquired form of the disease the first stage is called the period of incubation. This period embraces the time from inoc-

ulation until the chancre makes its appearance. The primary stage includes the appearance of the initial manifestations; that is, an indurated sore and swelling of the neighboring lymphatic glands.

What is called the third stage of the disease is the stage in which the secondary symptoms make their appearance. These consist of eruptions on the tonsils, inflammation of the membranes of the bones, inflammation of the eyes, and the loss of the hair.

The fourth stage or tertiary stage of syphilis embraces the more remote effects of the disease, such as the formation of bone tumors, deep ulcerations and various affections of the internal organs. All the cases do not show any tertiary manifestations. There is no certain duration of these stages, and one stage merges into the other so the division into stages is purely artificial. The disease usually begins to develop in from twenty to thirty days after being inoculated. One attack of syphilis confers as a rule immunity to the patient for the rest of his time. Second attacks are not more frequent than smallpox or measles.

The disease is acquired in the vast majority of instances, by sexual contact, although it may be acquired in other ways, as in kissing, or in any way being brought in contact with the morbid products of a syphilitic patient. The initial lesion is an indurated or hard sore that feels pretty much like cartilage. Some authorities of great eminence have stated that sometimes no hardness can be felt in the initial lesion. I think that is quite doubtful. The chancre develops in the male on the corona or just back of it as a rule, but it may

develop on any part of the head of the penis. It begins as a small papule, or it may begin as quite a simple sore. It sometimes swells in the neighborhood of the chancre, and in others there is little or no swelling. If the sore be kept clean there is only a slight discharge from it, which is a watery serum; but if it is allowed to go uncleanly pus may rapidly form, which usually aggravates the case and causes much swelling. Pretty soon the glands in the groins are found enlarged or swollen. The patient sometimes fevers up and suffers from loss of appetite, and general indisposition. The sore is usually painless and the swollen glands in the groins are generally not painful nor very sore.

As soon as the primary sore makes its appearance the patient acquires an immunity from reinoculation, so that a chancre of the hard variety, which means syphilis, cannot be produced a second time on the same individual except in very rare instances. The primary syphilitic sore is almost invariably single. A chancre may form in the uretha, and when it does it is always near the end, and can be diagnosed by opening that canal.

In women chancres are very rare on the vaginal wall. They sometimes are located on the mouth of the womb; but in the vast majority of cases they are located on the external organs of generation. Chancres are sometimes located on the lips, and occasionally on the tongue, and even on the hand sometimes, or other parts of the body.

Every patient who has an indurated chancre is already suffering from constitutional syphilis, and no burning with caustics, no application of any drugs nor excission will be of any avail whatever,

for nothing will prevent the patient from being subject to the various stages of the disease. That hardness may involve a considerable amount of tissue, or it may be very small. The severity of the case does not depend upon the amount involved in the induration.

The initial lesion itself will finally heal as a rule, without treatment, 'though it is rather slow and requires months.

The swelling in the groin, when amounting to much magnitude, is called a bubo. It may be on one side alone or it may affect the glands of both sides.

The secondary stage is very variable in its manifestations all the way from the very slightest effects to a severity to kill the patient. I have seen some cases that were typical in healthy individuals under proper treatment that manifested no secondary symptoms except a slight swelling about the glands of the neck, but as a rule the patient will have sores in his mouth, eruptions, sometimes copper coloreds blotches, and occasionally loss of hair; and those illy treated will often have large ulcers and large abscesses, bone-ache, loss of hair, and often impairment of general health. Weakly persons generally bear the disease badly. Old men bear the disease badly, and often manifest tertiary symptoms. The tertiary symptoms have among them aneurism paralysis, iritis, deep ulcers, sometimes a loss of bone, and gummata or bone tumors.

The personal habits and surroundings exert a powerful influence on a course of syphilis. The disease is seen in its worst form among those who suffer from insufficient food and clothing. Persons

given to the use of alcohol suffer worse. In young adults with sound constitutions under proper medical treatment, the grave symptoms of the disease are a rare thing. The state of a patient's health determines to a great extent the kind of an attack he will experience. After the symptoms of the disease have entirely disappeared they may be called into activity again by ill health or excess in the use of alcohol. It is a remarkable feature of syphilis that it often lies dormant for a long time and then manifests some symptoms.

Respecting the treatment of the first stage of the disease, the sore should be kept absolutely clean by bathing three or four times a day, and dusted with some antiseptic like boracic acid. The patient should not exercise much until the swelling in the groins subsides. He should not drink spiritous liquors, his bowels should be kept regular, and if his appetite be poor it should be improved by vegetable bitters; he should have three or four grains of calomel once or twice a week, and should take iodide of potassium in from fifteen to thirty grain doses, three times a day after meals, in water. This treatment should be kept up until the initial lesions disappear. Then the calomel should be dropped and the iodide of potassium continued in doses as aforesaid, for months, until all the secondary symptoms disappear; and even if none are existing it is best to keep up the treatment for months, and when once it is stopped, to resume it at once whenever the slightest syphilitic manifestation is noticed. The patient should have a liberal diet of good rich food, and after the primary lesions have disappeared he may resume his occu-

pation. It is proper to state that all persons affected with syphilis should use care not to convey the disease to others. A syphilitic patient ought not to get married sooner than one year in no way, after being affected with syphilis.

SOFT-CHANCRE.

Soft chancre, as the name implies, means a soft sore or several soft sores; sometimes as many as a half dozen or more, located on the genitals of the male and female in about the same situations that the hard variety occupies.

A typical soft chancre is somewhat eaten out and soft, and sometimes a little undermined. The surface of the sore, after it is fully developed, looks whitish. At the same time a bubo forms on the side that corresponds to the chancre or chancres, and if they be on both sides of the head of the penis there are usually two bubos in the groins. They are usually tender and sometimes very painful. They sometimes break down or pus forms in them and has to be evacuated. These chancres as a rule, need very simple management. They should be kept perfectly clean and dusted three times a day with boracic acid. They should never be burned as burning them with caustic often causes a very severe bubo. Under this simple management, if the patient will keep quiet and not do much stirring, the chancres will heal and the bubos disappear. As a rule soft chancres do not cause constitutional symptoms, but occasionally they do, and when they appear they resemble the constitutional symptoms of syphilis, and should be treated with large doses of iodide of potassium.

The patient should take from twenty to thirty grains three times a day after meals, largely diluted with water, and eat a liberal diet, and the constitutional symptoms will soon make their disappearance.

I might here say that the patient should use the proper cautions to avoid conveying the disease to others.

GONORRHEA.

Gonorrhea is an acute infectious and contagious disease produced by a micro-organism conveyed by sexual intercourse from one person to another. The period of incubation is from one to ten days. It begins by a discharge in the male from the urethra, and in the female from the vagina.

The discharge is yellowish in color and stains the clothing of a greenish yellow color. In the uretha it begins in the front part and progresses backward. At first it does not give very much pain, but when it advances to the vecical end of the uretha it gives considerable pain; especially on emptying the bladder.

In regard to the treatment, if the patient wants to get well quickly he should remain quiet and not work. As to the injections used they are many. A very efficient treatment is hot water as hot as the patient can bear it, with five drops to the ounce of compound tincture of iodine. With this solution the uretha should be washed out about every two hours; taking care to have the water just as hot as it can be borne, as the organisms cannot stand heat; it attenuates them and makes the case run a mild course.

I might say here that some of the most severe

forms of conjunctivitis that I have ever seen was produced from gonorrhea, and it is very generally conveyed by the hands of the patient to his eyes; therefore the patient should be very careful to keep clean hands, and also he should use care not to convey the disease to others.

In women the disease as a rule does not give them the same amount of trouble as it does men, but sometimes the organisms will find their way into the womb and produce severe prostration and get out into the fallopian tubes and produce what is called pus tubes which is quite a serious condition. Women from this cause have not unfreuently lost ther lives.

DIARRHEA.

Acute diarrhea may be excited by the character of the food taken, or impure water; or it may be excited by unhealthy secretions poured into the intestines; or it may be due to atmospheric influences. Sometimes it appears in epidemic form. When that is the case it is evidently due to some form of micro-organism. Its symptoms are thirst and uneasiness about the bowels; griping pain in the bowels; usually there is some pallor of the face and a slight debility, and frequent fluid evacuations, which sometimes becomes colorless. In some cases the patient is sick at the stomach and has a coated tongue. A diarrhea is an effort of nature to get rid of some impurity or noxious substance from the system, and appears in a number of diseases, and when appearing in other diseases is regarded as a mere symptom. The disease is much more common in summer than it is in winter.

The proper treatment is to take a mild purgative and if the case be stubborn to wash the bowels out. The patient should be confined to a fluid diet, and in cases where the diarrhea is simple, and is the disease alone itself, this treatment generally would be sufficient to affect a cure.

DISENTERY.

The symptoms of this disease are frequent and painful passages of mucuous mixed with blood. The passages are accompanied by a straining and bearing down, which is very characteristic of the disease. In the acute form the patient is thirsty, restless, and has a fever, and in severe epidemics is usually prostrated very much. In the severe acute form the disease is often ushered in by a chill. The fever is not usually high, and it is not often that the patient has a rapid hard pulse. In mild cases the pulse is not very much affected, and the temperature only slightly raised. Pain is always present to some degree. It has its seat in the large bowel, and is tender on pressure. The discharges are very small in quantity, and in some cases highly offensive, and resemble washings of meat.

Contrary to what many think, disentery is a disease of constipation. The patient is bound and the discharges come from the lower end of the bowels, which is the seat of the disease. The disease is due to a micro-organism and finds a suitable place for development on the mucuous membrane of the large intestine. Isolated cases of disentery are usually soon recovered from, but in the epidemic form of the disease the mortality is

frequently considerable. The evidence is rather in favor of the theory that the organism is carried about in the air. Some think that it is in the water, and it might possibly be in some cases.

As to the nursing, the patient should be kept quiet in bed, and in severe cases not allowed to get out of bed. His bowels should be washed out with warm water two or three times a day; he should have good cooling drinks like lemonade, and an exceedingly light diet in the fluid form, as milk and broth.

CHOLERA-INFANTUM.

As the name implies, cholera infantum is a disease of infants. It begins with diarrhea, and the little child soon vomits, but as the case progresses and the patient gets weak the vomiting gives way to diarrhea. The discharges are colorless, or yellowish or greenish. The child is usually thirsty and has some fever. The disease sometimes runs a rapid course and kills the patient in three or four days; but generally it continues for weeks or months. The disease is undoubtedly due to a micro-organism generally brought into activity by improper feeding. In the latter stage of severe cases the child becomes much amaciated, is very restless, and makes plaintive cries, and has rolling of the head, strabismus and coma.

The mortality of cholera Infantum is very high. Thousands die every year in our cities and large towns from the disease. The hygienic treatment is of very great importance. If the patient is in an ill ventilated, hot situation, a change to a cool healthful climate is desirable. The diet is of very

great importance. Sometimes when sweet milk disagrees, buttermilk, sour with ice in it suits well. No solids whatever should be given. The bowels should be frequently washed out.

CHOLERAMORBUS.

The attack is characterized by spasmodic pains in the abdomen, cramps in the legs, rapid loss of strength, and vomiting and purging. That thrown up from the stomach and cast off from the bowels are both liquid and contain considerable amounts of bile. The micro-organism has been found in the discharges, which is supposed to be the cause of the disease. When the disease is at its height there is cramps in the calves of the legs, and sometimes they produce hard knotty masses. The discharges have a foul odor, and the vomiting is constant. The thirst is intense, the skin is cool, but the duration of the disease is not long. In a few hours, or at the most a day, the symptoms yield to treatment and the patient speedily regains his health, but in rare instances the disease is rebelious to treatment, and the patient gradually sinks. Fluid diet, with rest in bed comprises the hygiene for this disease.

JAUNDICE.

The characteristic feature of this disease is a yellow skin, and yellowness of the whites of the eyes. The patient is usually depressed in spirits, and his circulation is depressed; in other words the heart beats slower than in health. The patient is constipated, and the discharges look very much

like clay in many instances. He generally has no fever; he has little or no appetite.

Sometimes jaundice is a symptom of other diseases, and often of a serious nature, but for the most part it is owing to the bile being improperly conveyed from the liver; so instead of it being poured into the intestine as it should be, it finds its way into the blood, and produces the symptoms just described. It usually yields to treatment fairly well. The patient should be placed at rest and fed on fluid diet; the constipation overcome with purgatives, and very generally he will soon be convalescent.

CIRRHOSIS OF THE LIVER.

Cirrhosis of the liver, the organ is diinmished in size and is dense and hard, and exhibits granulations of various sizes, separated by bands of fibrous tissue.

One of the chief characteristic symptoms of the disease is a dropsy confined to the abdominal cavity. On careful examination the region that in health is dull on percussion is diminished in this disease. As the disease advances we have a marked loss of flesh and strength. Sometiines jaundice cachectic appearance with sunken features; hemorrhages from the nose, mouth, and from the stomach, are some of the symptoms of the disease. The appetite and digestion are poor, and the patient grows gradually worse and worse. Very little can be done for this strange disease, for the nature of the disease makes recovery impossible.

ACUTE BRIGHTS DISEASE.

This disease is essentially of an acute character. After exposure to wet or cold a fever sets in. The patient often vomits and has pain in the region of his kidneys. His eyelids and face become puffy and swollen, and very soon a swollen condition of the skin is observed, especially in the extremities. The urine contains a large amount of albumen. The patient has a moderate fever, the pulse are usually quick, tense and full. Nausea and vomiting are a common occurrence. These symptoms last for several weeks. When in favorable cases they begin to abate. The temperature becomes normal, and the skin moist. The dropsy gradually disappears. The quantity of urine largely increases, and the albumen gradually disappears. but this is not the invariable issue. The disease often gradually lapses into a chronic form. The recognition of the disease is readily effected. The puffy, pale face, the dropsy, the albumen in the urine, with the tube cast, form a group of symptoms so peculiar to this disease that a physician with ability would very rarely mistake it.

The nursing in this disease is highly important. The patient should be placed on a milk diet and kept on it for weeks. He should be kept perfectly quiet and given large quantities of sulphate of magnesia. He should not be allowed to eat any solid food until a thorough test is made of the milk diet.

CHRONIC BRIGHTS DISEASE.

Symptoms of chronic Brights disease are frequent

desire to void the urine, swelling of the extremities and the face, pallor and general debility; headache located in the back of the head; large quantities of albumen in the urine.

There are few diseases which alter the character of the blood like chronic Brights disease, and it generally tells in the patient's face. The experienced physician can often pretty well tell in advanced chronic brights disease, what ails the patient by seeing his face. Yet there are other cases not so clear. In the vast majority of cases of chronic brights disease, the patient goes on from bad to worse and gradually sinks. It is thought by some that entire recovery is not impossible, but it does not often occur. The patient's life may be prolonged by proper feeding and nursing. The patient should be allowed to rest and kept for the most part, on a milk diet. He might be allowed broth, and occasionally a little solid food.

CHAPTER VII.

SURGERY.

The subject of surgery has always been more or less important; but since there has been so many advances made in the treatment of wounds and in the mechanical skill in doing operations, it is vastly more important than formerly.

In very ancient times surgery was done by the barbers, and later when it assumed the dignity of a profession it was often difficult to get operations of a hazardous nature done, and many persons died for the want of surgical aid. And even we read of operations being done by the patients themselves. In the seventeenth century a man by the name of Jean Dot, a blacksmith, of Amsterdam, made a knife and cut a stone out of his own bladder successfully by the suprapubic method, as large as a hen's egg. The stone and the knife and a portrait of the operator can be seen to this day in the museum of Layden, but at the present day if a man is a little anxious about an operation he can generally get it done. It is not many years since ovariotomy was questioned, and men were often allowed to die with stone in the bladder but a few decades ago. The operation of appendicectomy is not more than 16 or 18 years old. Removing stones from the gall bladder is only 12 or 14 years old. Hysterectomy was not heard of until for the last few years. But now all these operations

have been done thousands of times, and there are surgeons everywhere waiting for work to do.

In order to enlighten the public on the object of operations I will quote a piece from Erichsen's Science and Art of Surgery of University College London:

"By a surgical operation is meant a manual or mechanical process undertaken by the surgeon for the remedy of deformity, congenital or acquired; or for the cure or relief of a patient suffering from those effects of injury or disease that are incurable by constitutional or ordinary local treatment, or in which such treatment would be too slow in affecting the desired results. A surgical operation may be necessary for the following objects:

First, remedying or removing congenital defects and malformations, as hair lip, clubfoot, or supernumerary fingers or toes.

Second, remedying acquired defects and deformities, as in the closure of fistula, the restoration of lost parts, and the corrections of distortions of the limbs.

Third, the removal of foreign substances from the body, as in the extraction of a bullet or calculus.

Fourth, the repair of the effects of injuries as in the treatment of certain fractures and dislocations.

Fifth, the removal of parts that have been so disorganized by the effects of injury that their vitality is lost, or that their continued connection with the rest of the body would be a source of danger, as in amputation for frostbite or mangled limbs.

Sixth, the removal of diseased structures that

interfere with the utility of an organ or part, as in the extraction of a cataract.

Seventh, the removal of the diseased structures that seriously inconvenience the patient, or that remotely threaten life, as in the exterpation of tumors, simple or malignant.

Eighth, rescuing a patient from immediate and inevitible death, as in tieing a bleeding artery, opening the windpipe in laryngeal obstructions, relieving an overdistended bladder, or dividing the stricture in strangulated hernia.

Operative surgery is but the application of manipulative methods to the relief and cure of injury and disease. Like every other art, be it manipulative, plastic or imitative, it can be carried only to a certain point of excellence. An art may be modified, it may be varied, but it cannot be perfected beyond certain attainable limits, and so it is and indeed must be with that of surgery.

There cannot always be fresh fields for conquest by the knife. There must be portions of the human frame that ever will remain sacred from its intrusion; at least in the surgeon's hands. That we have nearly if not quite reached these final limits there can be little question. When we reflect that every large artery in the human body up to the aorta itself has been repeatedly ligatured, that each of the six large articulations and many of the smaller bones have been resected, that the amputation of each limb up to the shoulder or hip joint is a matter of ordinary surgical occurrence; that large tumors, having the most intricate anatomical connection have been removed from every surgical region in the body, from the base of the brain to

the lowest organ in the pelvic cavity; that the larynx, the spleen, the kidney, the pregnantuterus, and even portions of the stomach have been successfully removed. When we reflect on triumphs of the surgeon's art that are expressed by operations such as these, we can scarcely believe otherwise than that little remains for the daring of the boldest to devise, or the skill of the most dexterous to accomplish. In the extension of that art, in the direction of its operative department, and that the surgeon must in future be content to repeat though possibly in a modified and improved manner, those operations that have been inaugurated by the genius and perfected by the skill of his predecessors." Since this was written the entire stomach has been successfully removed on several occasions, and several feet of the intestines have been successfully removed a number of times, and even the heart has been sutured for wounds on several occasions.

The state of the patient's health often influences the success of an operation. Even more sometimes than the severity of the operation itself. The age of the patient influences the operation to a very great extent. Persons over seventy years old rarely survive a capital operation; even removing stone from the bladder in men over sixty is not often successful. Very fat persons bear operations very badly. Persons of on irritable and anxious mind bear operations badly. Those also of a feeble circulation do not withstand operations well. Persons with valvular disease of the heart are bad subjects for operation. Those with Bright Disease usually die under capital operations. Those with

diabetes mellitus do not often withstand an operation of a capital nature. Patients with a high temperature should not be operated upon except in the so-called surgical emergencies. Individuals of sound constitution who have never been impaired by excesses of any kind; whose habits have been temperate, and who have been well fed; whose minds never have been strained over the anxieties of business, or the labors of a professional life, and who have spent their lives in rural occupations, and in the pure air of the country, are in a far more favorable position to bear operations of magnitude, than the man who is worn out by active and unceasing business vocations, or professional men whose nervous system is exhausted by anxious labor, and vastly more than the poor inhabitant of the large and densely peopled city who have from early childhood breathed impure and a fetid atmosphere; whose food consists of the refuse of the shops, and whose nervous system is exhausted in the daily struggle for a livlihood.

It is quite certain within the rural districts that there are many persons die now from diseases that could be cured by a surgical operation. On the other hand, in the large cities and large towns there are many operations done unnecessarily and even harmful to the patient. The great anxiety for fame among the great army of surgeons at the present day, and the greed for money, prompts many of them to do operations unnecessarily. A patient that is the subject of a surgical disease should endeavor to consult an enlightened and honest surgeon; one not over-anxious for the fame of doing many operations, nor greedy for money.

It appears that many surgeons at the present day endeavor to build a reputation by the large number of cases they have operated on. They in this way become completely carried off with the use of the knife. There can be no doubt that conservative surgery or rather enlightened conservative surgery is a great blessing to humanity, but the great tendency of the day is for physicians to become specialists, and a great number of them take surgery as their specialty.

It would be surprising to many persons living in the country to know the large number of operations that are done in all the large cities every day. The great craze to operate at all hazards is the chief fault of surgery. The clean hospitals and antiseptics methods of doing operations, and the facility with which the knife is used there is very little to condemn in it. As time is a great corrector, no doubt in time that fault will be corrected. That is doing unnecessary operations.

GENERAL-NURSING.

In the cities and many of the large towns, trained nurses are available; but in villages and in the country, the people generally have to do their own nursing; and if good nursing is a part of the cure, and it appears to me to be a very indispensable part, it is quite an important thing that the people be informed on it. To be a good nurse really requires an intelligent person. Women as a rule make better nurses than men. Where persons are not trained, if they be intelligent, it does not take them long to get at the essentials of good

nursing. Among the ignorant classes and those unable to employ nurses, it is almost impossible to carry out the principles of good nursing. In all contagious diseases, as smallpox, Scarlet fever, Diphtheria and Measles, the attendant upon the sick as a nurse, should wear a clean white gown when in the sick room, and should change his clothing and bathe very often. The gown worn in the sick room of contagious patients, should not be worn when out with other persons.

Some of the important duties of a nurse is to give medicine exactly on time, be able to adjust the bed for the patient, know how to sponge or bathe the patient, to draw his water when necessary, give an injection by the bowels, wash out the stomach, apply poultices when necessary, and see that the food is prepared and administered to the patient according to the order of the physician in attendance.

The place for a sick person, if very much indisposed, is in the bed. Many sick persons when they should be in the bed, consume their strength by exercise, and should the disease prove of a serious nature they have but little vitality remaining with them to withstand the disease. When in any doubt as to the nature of a disease, an enlightened physician should be called.

The duty of the nurse or whoever attends to the patient, and it is best for one person alone to take charge of him, is to follow the physician's directions. All meddlesome neighbors, or gossiping visitors, no difference how well meaning they may be, should be ignored. They are to be found in nearly all communities claiming to understand the deep

mysteries of medicine, when the health and the life of the patient is often at stake. As people become more enlightened they will be less inclined to put in their judgment against those that make it a life study. It is generally conceded that persons suffering from any severe disease, should be in a well ventilated, clean and very light room. Light exercises a good influence upon the sick. The ideal room is not often attained; especially in rural districts. Of course during the hot summer days the rays of the sun should be excluded off the patient. Light never should be permitted to fall directly into the patient's eyes. Plenty of light can be admitted into the room and the patient screened from the light falling directly into his face. Doors and windows should be managed so as to exclude draughts. The best way to ventilate in winter is to open a window in a hallway or adjoining room, that the cold air may be modified before it reaches the patient. Unless there are no other means of heating, oil stoves should not be allowed on account of their quickly contaminating the air. Oil burners when they are turned low, are more poisonous than when allowed to burn free; so when a night lamp is necessary it should be allowed to burn freely.

A very good way to cool a room in the summer time is to hang up wet sheets in the room, or place a large block of ice in a basin near the bed of the sick.

Dry air is best for rheumatism and moist air for croup. Moist air may be obtained by keeping a kettle boiling. As to the furniture of the sick room, every piece that is not needed should be removed.

In contagious diseases no pieces of carpets, curtains, nor stuffed furniture should be allowed in the sick room, as these often retain the germs and may be a means of spreading the disease. Cleanliness should be maintained to the utmost throughout. A patent sweeper or a wet cloth over a broom is best to sweep the carpets with, the dusting should be done with a damp cloth.

Medicine bottles should not be scattered around in the room, nor anything that suggests sickness. They should all be kept out of sight. The attendant should carefully read the directions every time the medicine is administered, to make sure that there be no mistake.

The nurse should give medicine strictly on time, but the patient should never be awakened to give medicine under any circumstances.

The food should be given with the same regularity as medicine. Food should not be allowed to remain in the sick room, especially such as milk and fluid foods, as they absorb poisons and foul odors. Except in mild illnesses feather beds should not be used. It is often very difficult to keep them from having an uneven surface, and they prove an exciting cause of bed sores, which is often quite annoying, not only to the patient, but his physician and nurse.

For summer a cotton, shuck or straw mattress makes a good bed, with a blanket spread over it, and for very cold weather there is nothing equal to wool most simply made up and kept free from wrinkles and rolls. The undersheet should be stretched tightly across the mattress and tucked under it—not stuffed around it as is ordinarily done. All

bed coverings should be light in weight in order that the patient may breathe freely. Heavy coverings are not proportionately warm. Two light blankets are warmer than one extra heavy one on account of the air being between them, acting as a non-conductor of heat. Where the bed is a double one, and in the absence of two beds in the room, the patient should be removed from one side of the bed to the other so that he may occupy one side of the bed during the day and the other side during the night, so that the bed may have some chance to be aired and freed from impurities; 'though it is best to have two beds for a sick person, and change the patient night and morning from one to the other. Well persons should not sleep with the sick, inasmuch, it is very disagreeable and it may serve to convey the disease to the healthy.

The patient sometimes complains of the sound of his own heart-beats; in other words the sound is conveyed to the pillow on which he rests. In this case a hair pillow should be procured if possible. A hair pillow does not conduct the sound so freely, and it is also very agreeable to fever patients.

The proper way to clothe a sick person is the simple way. Very generally a night-gown is sufficient. This makes changing of the clothing easy, and saves wearying of the patient.

In order to change clothing on one that is sick without bringing him to the sitting posture, and without undue exposure, the soiled clothing should be gradually worked up as far as the shoulders then one sleeve should be slipped off; now the arm should be placed in the sleeve of the clean one; now the other arm should be dealt with the same way; then

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the gown should be placed over the head and gradually worked down beneath the back.

For a very weak person who cannot bear to be moved in the least the gown should be slit up all the way down the front and placed on like a child's apron, with the wrong side in front. It is necessary in dressing a person with a broken arm or leg, to place the garment on the injured limb first; when undressing, disrobe the well limb first. Many intelligent persons entertain an unfounded prejudice against a full bath for invalids but it is a fact that there is a great deal of waste constantly coming off from the sick person by the way of the skin; and cleansing of the skin keeps this waste from being reabsorbed, and often is a factor of no little consequence in the patient's recovery. When the bath is properly given no fears need be entertained that the patient will take cold. In many instances it is desirable to bathe the patient every day. To accomplish a full bath, the patient's clothing should be removed, he should now be placed on a blanket. To do this turn him on his side with his back to you. Now the blanket should be well placed under him, then he should be rolled back upon it until he lies on his other side. Now the nurse goes to the other side of the bed and straightens the blanket under him in the same manner as changing the undersheet. Now he should be covered with a blanket; the nurse will now expose one portion of his body at a time and wash and dry thoroughly. This should be covered and another part exposed and dealt with in a like manner, and so on until the bath is completed.

In nursing, the care of the toilet embraces many little details. If the patient be a lady, the hair should be braided from the start so that it will not become entangled. The mouth of the patient requires care; especially in low fevers. The impurities that often accumulate on the teeth and gums, are sometimes difficult to remove. A swab should be made by a soft cloth wrapped around the end of a stick. There are many forms of mouth washes that are very efficient. The nurse can easily prepare one. Equal parts of lemon juice, glycerine and water makes a good wash. The swab should now be dipped into this wash and the mouth gently but thoroughly cleansed.

Dry lips should be anointed with some bland oil. The nose should be cleansed of its secretions to prevent picking at the nose which is apt to occur in typhoid fever. The nose may be bathed with listerine, and then anointed with some bland oil. The finger and toe nails should receive attention; they should be trimmed frequently, as it contributes to the comfort and appearance materially.

Bed sores are often a troublesome complication in low fevers and other protracted illnesses. The nurse should carefully examine on the hips and other bony parts of the body, for any indications of them. When any indications appear of bed sores a teaspoonful of alum placed in a half pint of alcohol will be found a very useful thing to bathe them in, and will often prevent their forming. This treatment hardens the skin and makes it more resisting to the exciting influence of the sore. The patient should be changed often from one position to another. This will be found to be useful in pre-

venting these troublesome bed sores. Moisture contributes to their formation, and for that reason they should be kept as dry as possible. After the application of the alcohol they should be dusted with boracic acid. Should they break down into an open ulcer the physician in attendance should be notified so he may apply his favorite remedy.

The duty of a nurse is to endeavor to preserve the strength of the sick in his or her charge, knowing that the strength of the patient means the life of the patient. For that reason he should not be asked unnecessary questions; for to extremely weak people even thinking and talking is very exhausting. Hearing would appear to be more acute in the sick than it does in the well, therefore persons should not be allowed to whisper in the sick room. The patient strains himself in the effort to hear what is said and often it arouses his suspicions. The talking that is necessary in the sick room should be done in subdued tones so that the patient can easily hear all that is talked about without being shocked by a loud voice. In low fevers the patient often gets into a stupor, and it is often the case for persons to try to arouse them by calling them aloud. That should not be done at all. A very efficient way to get a patient out of a stupor is to put on an ice cap or apply cold water to the back of the head. When people are very low they should not be raised to a sitting posture for no occasion. In such cases the bed chamber should be made use of on all occasions. Raising the patient in extreme prostration may bring on heart failure. In such cases an invalid's cup for medicines, food and water should be used.

The nurse should use care to see that the feet are always kept warm. Cold extremities is a powerful weakener of the heart's action. Where rubber water bags are not to be had, bottles filled with hot water, wrapped in a yarn blanket will serve the same purpose to keep the feet warm.

Respecting visitors when people are extremely low, it is best to exclude them altogether; especially sympathetic friends who mourn or recite stories of distress. Nurses during the doctor's absence, should keep a record of all occurrences of a peculiar nature that the patient may experience, and on his return should communicate it to him.

In giving an injection or enema into the bowels the best instrument is the fountain syringe. For this purpose soap and water are commonly employed Pure soap like castile should be used, and should usually be made as warm as the patient can bear it. There are however, some exceptions to this rule. The injection of cold water in diseases with a high fever can often be made a means of reducing the temperature, and is in this way very useful.

An adult person can usually take by injection from a half gallon to three quarts. The amount for children would have to be reduced in proportion to their age. The fourth of a pint for a little infant would generally be enough. Before the instrument is introduced into the bowels, if a bulb syringe be used, the bulb should be filled so as to free it from air; otherwise you may give your patient a great deal of pain.

The patient should lie on his side to receive an enema.

The instrument should be introduced with care

and gentleness. If the injection causes pain the operation should be suspended for a few minutes, until the pain ceases, and then proceed again with the injection. When the operation is complete a folded towel should be placed against the parts and held for two or three minutes so the injection may be retained. The instrument should always be cleansed thoroughly after each injection to keep it in good condition; and it should not be placed back in the box, but hung up at some convenient place. There are a number of instruments on sale of late years, constructed to give an injection in a sitting posture. They do very little good. The patient should always lie down to have an injection.

In cases of throat and lung diseases inhalations are sometimes prescribed. The common Japanese teapot is suitable for the patient to take these inhalations out of, boiling water is poured into the teapot and the medicine prescribed put into the water. The lid is placed on the pot; the patient is now directed to place his mouth over the spout and breathe through it in a quiet way. After taking five or six breaths he removes his mouth from the pot and breathes in the natural way, for a minute or two and then repeats the breathing from the kettle again. This treatment should last from ten to twenty minutes. In fevers, applications of ice are sometimes highly useful. A rubber ice cap is manufactured for the purpose of holding the ice. In case of necessity one should be procured. It should then be partially filled with crushed ice and pressed to get rid of the air. This renders it comfortable to the shape of the head. A piece of cloth should be placed between

the cap and the patient's head, as the cap may sweat. To crush ice, wrap the lump in a coarse towel before breaking. This prevents the pieces from flying around when broken. When a rubber water bag is needed it should only be partially filled; then the excess of air should be squeezed out in the same way as in filling the ice cap. In order to avoid burning the patient the water bag should be wrapped in a yarn blanket.

When a patient is able to sit on a chair for a few minutes undressed, a blanket should be pinned around his neck and brought around his whole body; tucking it under to exclude the air.

CHAPTER VIII.

THE PROPER CARE OF YOUNG CHILDREN.

Very generally little children when they are healthy, if they are sensibly cared for they will remain healthy. The vast majority of illnesses among little children is due to their improper treatment by the nurse or parents. As such a great proportion of this sickness is brought about by the feeding of the child, I will treat of that first.

The stomach of a new born infant is only capable of holding two or three tablespoonfuls of milk. This fact should be impressed upon the mother or nurse, for most persons would think that a child's stomach would hold very much more than that. A large number of the cases of diarrhea, children with painful stomachs, that cry and fret and give so much trouble, is owing to their nursing too much. It would be a very hard matter to lay down any strict rules as to how long or how often the child should nurse. In the first week every hour and a half or two hours would be often enough. And the second and third weeks, every two hours. From the third to the sixth week, they may be allowed to nurse about every three hours. In the meantime they should not be allowed to nurse but a short while at a time. Placing them to the breast to appease them when they cry is often overfeeding them. Children, like grown people in some respects, can form habits that are hurtful to them,

and in the matter of nursing that is often the case. Very large and robust children require more than delicate ones; and if the mother be healthy the best food for her offspring is her own milk that nature has provided.

In feeding artificially it is safest to consult a physician; for what agrees with one child may not agree with another. Cows milk is certainly next to mother's milk for feeding the child. The milk should be obtained from a healthy cow, and milked with a great deal of care so that it may be perfectly clean. There is an idea prevailing that boiled milk is better than raw or fresh. My experience has taught me that unboiled milk, if it is clean and used fresh from the cow, is far superior to boiled milk. Cooking of milk hardens some of the constituents of it; and as the child's stomach is always a very delicate one it very often disagrees.

When a child is doing well, resting well at night, and gaining in weight, it is not safe to make any radical change in its feeding; and I might say here that the changes in feeding should be made gradual whenever possible. When he is losing in weight or rests bad at night, or has colicy pains, his food should be carefully looked into; the amount he is taking, the health of the mother, or if cow's milk be used, whether it is used fresh or allowed to stand before use, or whether it is milked with the proper precautions, for that is a very important thing. The child that is properly fed, at the proper intervals will not thirst for the breast at improper times, save when his appetite has been perverted by improper feeding. The practice of nursing the child every time it cries should be condemned. Intelli-

gence should suggest that there are many other causes of discomfort aside from hunger. The clothing may be too tight, or it may be damp. The child may be constipated, or too much gas may collect in the bowels. In the last named instance, while feeding might appear to afford relief momentarily, it really adds gravity to the case. If the child is distended about the bowels and cries, it is likely that there is too much gas in the bowels. A good way to get rid of these gases is to inject from a quarter to a half pint of warm water into the bowels, and repeat it several times. This will usually give relief. Glycerine may be added to the water; say about a teaspoonful to the injection. As a very general rule medicines should be kept out of a little baby's stomach. Almost all the soothing syrups, cordials, patented and proprietary preparations prepared for children contain opium in some form, or some other deadener to the nervous system, which are not good drugs for a little child. The injections of soapy water will relieve constipation as a rule. In case it fails a teaspoonful of rochelle salt may be given in a little water and repeated in three hours until the bowels move. Castor oil is sometimes used, and may do very well in some cases. Cases of obstinate constipation requires the attention of a physician, A great deal of care should be used with a mother's breast when she nurses her child, to keep it absolutely clean; for whenever there is uncleanliness micro-organisms abound. They often gain entrance to the child's stomach, and they may produce sore mouth, diarrhea, cholera infantum, and other disorders of the digestive organs.

Before and after each nursing the nipples of the mother should be cleansed with warm water. When the child is fed by the bottle the infant should have two bottles to suck from, and two black nipples. Long tubes are objectionable on the score of uncleanliness. When the child is using one bottle the other with its nipple should be kept in water with washing soda in the water. The nipple should be thoroughly washed after using each time, both inside and outside, so that there will be no milk left to sour.

From nine to twelve months is a suitable time to wean children; but if this occurs in the hot summer months it is better to wait until the approach of cold weather, as changing off on other diet often sets up diarrhea and cholera infantum, which carries off so many little infants. Sudden weaning is not proper. The child should be at first, in process of weaning, allowed to nurse some and take some cow's milk. This should be carried out for at least a month before the breast is entirely withdrawn. Cow's milk is the food for a child for the first three months after he is weaned; then animal broths and a little well cooked rice may be added. Later on a half done egg poached, with a little butter occasionally, will give strength to a child. The child should be at least three years old before he is allowed to take the general table food; and then it should be properly prepared, and of the most digestible character. A very young child occasionally needs a little water, which may be given out of a spoon. Children are sometimes fretful for want of this. During the second summer a great deal of care should be exercised

in feeding the child. Raw fruits should not be allowed. A little cooked fruit occasionally may be allowed. If the proper care were taken in feeding the child the second summer it would not often give more trouble than the first. The clothing should conform to the season. In warm weather it should be cool and light. Light flannels should be worn throughout the year, next to the skin; 'though it should be the lightest obtainable in warm weather. The clothing should be made to fit rather loosely to give room for the development of the various organs. Most children, if the temperature of the water is comfortable, enjoy a plunge bath, which may be given daily; but should the child be a delicate one he should be sponged over with tepid or warm water, after which care should be taken to dry him good. Sometimes children are frightened at the plunge bath. A sheet may be folded and the baby placed upon it and carried down slowly into the water. The child should be put to bed rather early, and in order that he may not be fretful there should be a fixed time to put him to bed, so that he will form a habit of going to sleep at certain hours. This will contribute not a little to his resting easy of a night. The child should be taught to go to sleep without being rocked; and when he forms the habit he will not require any rocking.

Infants, like grown people, can form habits that exert no little influence over them, either good or bad ones. Some children form habits of crying, and it is very difficult when once they do, to make perfectly quiet children out of them. A large quantity of sleep is a good thing for a child. They

should never be kept up late at night. It often renders them excitable and easily disturbed during the sleeping hours. The eyes of a child should be protected from strong light, whether he be asleep or not. Children should not be exposed to contagious diseases under the impression that they should have the necessary children's diseases, as they are sometimes called.

SUMMER DIARRHEA IN CHILDREN.

This disease is caused by a micro-organism. Some attribute it to teething. It is very doubtful whether teething has anything to do with it or not. The disease is more easily prevented than it is cured; especially when it has stood for weeks or months. Among preventive measures perfect cleanliness is of the first importance; of the child himself, or his surroundings. He should have plenty of pure air to breathe; he should be frequently bathed. His soiled napkins should be washed often, when diarrhea does exist, no matter to how limited an extent, washing of the napkins is obligatory. A nurse should also disinfect her hands, otherwise she may re-infect the patient. The diarrhea should not be treated as a trivial affair. A mild purgative may be given. A teaspoonful of rochelle salt should be given and repeated every three or four hours until it operates freely. In the meantime the bowels should be washed out about three times a day with tepid water. Should this prove inefficient a physician should be called who will carefully look into the diet and general management of the patient, and prescribe such remedies as are necessary. There

is hardly anything more important than attentions to diet in cases of this kind. There seems to be a considerable relation between artificial feeding and diarrhea, and for that reason children should not be weaned during the heated months of the year.

When the baby must be placed on food other than what nature has provided, it should be given with strict cleanliness. In the case of breast fed babies the enforcement of all the rules of cleanliness of the mother's breast and the baby's mouth, should be enjoined.

During the season of excessive heat children as well as adults, require less food and more water to maintain health. The child should not be allowed to nurse as long in hot weather as in cool. In case the diarrhea does not yield in a few days to medical treatment, if it be in hot weather, a change of climate sometimes is desirable. Should the change prove beneficial the child should be kept in the new climate until he fully recovers. Even when the child is very much prostrated from summer diarrhea, and when there is a high fever, they seem to do better out of doors in well shaded parks, or other shaded situations, during the daytime, than they do housed up. A child will usually do better lying in a carriage or hammock than on the mother's lap. The heat of the mother seems to be injurious to it.

When perspiration is excessive cotton or linen may be placed next to the skin. Sponge bathing should be had recourse to which quiets the little fellow, inasmuch as it is desirable for cleanliness sake. A little vinegar or alcohol may be added to

the water. Should the physician prescribe the plunge bath it is well to place the little fellow in water at about the body's temperature, and reduce it with cold water to 75 or 80 degrees fahrenheit. Ten to twenty minutes is long enough to give a bath of this character. The little fellow may be rubbed gently while in the water to assist the circulation of the blood. In severe cases of this disease digestion is often entirely arrested so that the administration of food will prove harmful rather than good; and for that reason should be withheld until the child improves a little.

The skin of the child should be kept dry and dusted with some of the dusting powders prepared for the purpose to prevent chafing.

There is a very prevalent opinion among people generally that people should eat when they are very sick, even when they have no appetite. This opinion for the most part is erroneous. When nature removes the appetite if the removal be complete, at the same time it removes the powers of digestion, and it is generally vain to give food until a little appetite is secured; and such is the case with a little child. They do not often starve to death when the cause of the disease is removed. The patient will most invariably gain an appetite, and he should then be fed with discretion.

After the patient is convalescing solid food should still be withheld for several days. The patient will not starve on fluid diet, such as milk and animal broth. The diet is so very important in the treatment of these diarrheas it should receive equally as much attention in its administration as the giving of medicine. During the remainder

of the summer much care will still be required to prevent relapses, which are usually owing to errors in diet.

THE NURSING OF CHOLERA INFANTUM.

Cholera infantum is far less common than summer diarrhea, but it is a very severe disease; the mortality ranges very high. It often begins with a diarrhea. The symptoms of it have already been described in this work. When any of the symptoms of Cholera Infantum make their appearance the physician should be called at once. Both the preventive and nursing care call for measures similar to those advised in summer diarrhea. In extreme cases bathing may have to be resorted to every hour, as it is accompanied by a fever. Cold cloths or an ice cap should be kept to the head continually. Should the body become cool, hot mustard baths should be made use of, after which the patient must be kept warm by placing around them hot water bottles or the hot water bag; care being taken not to burn the patient's flesh.

THE NURSING OF WHOOPING COUGH.

Whooping cough is a very contagious disease and is chiefly found among children. Young children are more susceptible to it than to any other contagion; and when it occurs during this stage of existence it is often a very serious disease. In the little infant it is often complicated with Broncho Pneumonia and Diarrhea. In the aged it is a very serious disease; for in this advanced time of life the blood vessels have lost so much of their resisting power they sometimes rupture and

prove fatal. It is not a dangerous disease after the fourth year, provided the child has a sound constitution. Delicate children are more liable to it than strong robust children. The earliest symptoms are very much like a cold. Redness of the eyes, discharge from the nose, with a slight fever and a cough, forms the chief symptoms of whooping cough. It is usually some days or even weeks in some cases, before the peculiar cough is heard, which is characteristic of the disease. The cough comes off in paroxysms. They are at first rather mild, and fewer in number than later on in the disease. In severe cases they are always distressing. A single severe paroxysm may last two or three minutes, and be accompanied by a half dozen whoops, which appears to afford some relief. The nose often bleeds but the hemorrhage is usually slight; the patient often vomits. This is called the spasmodic stage, and lasts about one month, and increases in severity for at least the first two weeks, and then begins to decline in severity. To this rule there are many exceptions, for when the disease appears in winter it sometimes holds on for months. Paroxysms are often excited by draughts of air or eating anything that is cold, and are more frequent in the night than in the day, and in closed rooms than out of doors. Little children sometimes are completely overcome with the cough. In this instance they should be placed on their backs and cold cloths put to their heads.

In nursing the patient he should be kept out of doors in the daytime as much as possible; but great care should be exercised that the patient is clothed sufficiently; and in very inclement weather, he

should retire altogether to his room, as taking cold intensifies the disease very much. Food must be given often and should be of a nourishing and very digestible character. Should diarrhea set in it should receive prompt attention, as this renders the nourishing of the child quite difficult.

When the cough persists after the disease has run its course the child should be taken to some mild climate where the air is bracing. Second attacks of whooping cough do not often occur.

THE NURSING OF MUMPS.

The greatest number of cases of mumps are met with in children. This is also a contagious disease. It is, generally speaking, not a very serious disease. Complications are not very frequent. The most common complication is inflammation of the sexual organs. The symptoms are headache, pains in the back and limbs, and sometimes the patient complains of being chilly; there is some fever; a loss of appetite, and the patient sometimes vomits; pains about the ears, with swelling of the parotid glands. The pain is aggravated by swallowing any kind of an acid. This swelling referred to is just in front of the ears, and rather below. It may be on one side alone, but usually it is on both sides. This disease usually needs no medicine of any kind. If the case be rather severe the patient should be kept in bed. If the pain be severe about the parotid glands, cloths wrung out of hot water applied to them will give relief.

The diet should consist of fluids alone. Solids usually give pain in chewing and swallowing.

NURSING OF MEASLES.

In the nursing of measles the patient should be put to bed in a well ventilated room. The room should be well shaded to protect the eyes of the patient. The patient should not read on account of the condition of his eyes. The room should be kept with a moist air in it by boiling of a kettle of water; especially in the case of children, as it enables them to breathe much easier. Many persons believe in packing on lots of cover to break them out, as they say, also they deprive them of cold water. While it is important to avoid draughts and keep the patient from being chilled, there is not a particle of use of anything but comfortable covers on, and the patient should be allowed all the cold water he wants. The tendency of the cold water is to hasten the appearance of the rash rather than to hinder it. The diet should be that of liquids, such as milk and animal broth; and even upon recovery, solid food should be gradually returned to.

Severely inflamed eyes should be frequently bathed with a solution of boric acid. When the fever runs high an ice cap should be kept on the head. The feet should be kept warm. Woolen undergarments should be worn. As soon as the rash has disappeared the patient should take a warm bath daily, and the skin be oiled with olive oil to facilitate the peeling of the little scales that come off of the skin. The patient should be quarantined four weeks from the beginning of the attack. A separate set of dishes should be kept for the sick room and boiling water poured over them

before they are washed in order to destroy the germs. Handkerchiefs or cloths that are used by the patient should be burned. Nurses should not mingle with others until they have changed their outside clothing. When the child is convalescing it should be kept in a comfortably warm room until every symptom of the disease has disappeared. A second attack of measles is not common.

In the nursing of German measles, which is distinctly another disease, the same principles hold good that have just been laid down for measles. Very little medicines, if any, are needed for either one.

CHICKEN POX.

The eruption usually appears first upon the face and scalp in chicken pox, in widely scattered spots, spreading slowly over the body. It usually appears in the form of a bleb with a little watery fluid in it. Sometimes the skin may be nearly covered on some parts of the body. Chicken pox is contagious and also goes in the air. It is a very trivial disease, and does not often result in mischief.

Children should not be sent to school. The body should be kept clean and the patient not allowed to scratch the blebs, as that may cause them to inflame. It is unusual for any one to have the disease more than once.

THE NURSING OF SCARLET FEVER.

From the very beginning of the attack, no difference how mild the disease may be, the patient should be separated from the rest of the family. Disinfection of the bed, the patient's clothing, and discharges from the patient and the nurses hands

should be rigidly enforced. The best bed is a flat cheap mattress which may afterwards be burned. Scarlet Fever is a disease with a number of complications. Kidney disease being the most common. During the progress of the disease the patient should be allowed plenty of water, which, to a considerable extent, prevents the kidney complication.

As to the diet, it should be strictly fluid, consisting of milk and animal broth. While the fever lasts the room should be kept cool. When the fever runs high an ice cap should be kept to the head. After the fever and rash have disappeared the patient should have a warm bath daily. It takes from six to eight weeks for the scales to be completely shed. The throat is sometimes very sore in swallowing. An ice bag placed under the throat contributes materially to its relief. The mouth and nose should be kept clean in order that the inflammation may not extend into the ears and cause deafness. When the patient is recovered disinfecting baths for the patient and the nurse and fumigation of the room should be practiced. The patient should not be allowed to mingle with other people for about a month after the disease disappears. The second attack of Scarlet Fever is not common.

FEVERISH CHILDREN.

Children are very susceptible to influences which cause a rise of temperature in the body; and the fever frequently is not significant of any great danger. A perfectly well child may in a few hours flush up and the temperature run up two or three degrees. Sometimes a passing attack of indiges-

tion is the cause of it. Usually a mild purgative, and allowing the child to be kept at rest will in a day or so at least, bring about a cure. The child should be allowed all the water he wants; his head should be kept cool, and his feet kept warm. Nothing should be given to eat until the fever disappears; and then a light diet for a day or two will be all that will be required.

THE NURSING OF DIPHTHERIA.

The nursing of Diphtheria patients requires that they be confined strictly to the bed. Even in cases that appear rather mild exertion sometimes causes fatal results. There is a tendency in many cases, owing to the poison that is in the blood produced by the micro-organism, to paralysis of the heart.

As to diet it should be of liquids, and when the appetite is sufficient, reasonably nourishing in character. As a rule milk and animal broths are the best diets. If the case is a nursing infant it should not be put to the breast, but fed on the mother's milk after being obtained by the breast pump. The care of the breast pump demands scrupulous attention in the way of cleanliness. It should lie in water to which has been added a lump of washing soda, and should be rinsed before using again.

With the exception of the physician and nurse no one should be allowed in the sick room. Isolation should be complete, regarding both the sick room inmates and all objects with which they come in contact. All dishes and utensils used in the sick room should be boiled in water for 20 minutes.

All articles not strictly needed should be removed from the sick room; such as carpets, stuffed furniture and drapery.

In administering treatment, to insure against danger, the nurse should hold a piece of glass or cloth before her face as the patient may cough and expel some of the poisonous matter, which is contagious, and might be conveyed to the nurse in this way. All cloths used in wiping away discharges should be burned at once.

A disinfecting solution should be kept in the bed chamber, and after the discharges are discharged into the chamber, it should be allowed to stand a half hour or more.

The nurse should go out into the open air each day, and should eat plenty of good digestible food. After recovery of the patient the room may be fumigated with formalin solution.

During convalescence Diphtheria patients often manifest a tendency to paralysis. It may involve the eyes, certain muscles of the throat may be affected, so the patient swallows with difficulty, or the arms and legs may be to some extent paralyzed. With rest, and hygiene, the patient generally recovers. Sometimes kidney disease is a sequel of Diphtheria. Any indications of this, such as scanty urine, should be reported to the physician. As little exertion as possible should be indulged in for weeks after recovery, as heart paralysis is said to be more likely to occur in convalescence than in the initial stage.

THE NURSING OF TYPHOID FEVER.

In nursing a case of typhoid fever the patient

should be put to bed and kept as quiet as possible. All excitement or exertion causes loss of his energies, which is certainly needed in tiding him through this severe fever.

The nurse should impress upon the patient the necessity of giving up and confining himself to the bed. A mattress is most suitable for him to lie on. Feather beds are not suitable. A cotton mattress in the summer or wool mattress in the winter is the kind of bed for the patient. Everything should be done to keep down the body temperature. The room should not exceed 70 degrees. In warm weather sheets wrung from ice water are useful hung up in the room. By the cold water vaporizing brings down the temperature considerably. Ventilation is absolutely necessary; though a draught is not desirable.

When the physician orders sponging or bathing for the reduction of temperature in typhoid, he should give specific directions as to the temperature of the bath. In sponging or bathing no undue pressure should be made on the patient's abdomen by the nurse, as the bowels are very tender and the abdomen swollen.

The patient should not be allowed to lie too long on his back. In fact it is desirable to change the position reasonably often. This should be done with much gentleness and care. In the meantime the nurse should notice the prominent bony parts to see if bed sores are likely to form, and if they are the physician's attention should be called to it.

The patient should have an abundance of pure water. Water flushes the system and assists ma-

terially in getting rid of the poisons. It might be regarded as part of the curative treatment. When the fever is high the ice cap should be employed, or in the absence of this cloths wrung from cold water applied to the head.

In regard to diet a fluid diet should be rigidly adhered to. I have found sweet milk often to disagree. Buttermilk partially sour is one of the best diets for a typhoid fever patient; but if he has an appetite for broth he may be allowed chicken broth or other animal broths.

Great care is necessary in the return to solid foods, after the patient is convalescing. Solid foods have been known to cause death weeks after the fever ended. One of the very particular times is when the appetite is beginning to return to the patient. His appetite has been perverted by the disease, and he often craves things that would prove fatal to him. The nurse should not allow kindness to overrule good judgment in the matter of feeding. There need be no fear that the patient will starve to death if he has plenty of the diets named above. Beef tea is often given and some would think it a food. It has very little nourishment in it; it is more of a stimulant than a food. The fluids taken by the patient especially milk, should be swallowed slowly; otherwise in the case of milk, curds often form and disagree with the patient. It is the duty of the nurse to examine the discharges carefully in the absence of the physician, and report in detail as to their character. Regularity should be observed in giving medicines and foods; with the exception of when the patient

sleeps; and then he should not be awakened to give either medicine or food.

During the early morning hours the patient is usually very weak and should receive special attention in regard to his diet. Some food in the early hours of the morning helps to tide him over the weakness. No special rules can be laid down as to the exact amount in each case. The condition of the patient and his ability to take it should serve as guides for its administration. Usually as much as he will take of the kinds stated above will not prove harmful to him. It is better to give small quantities at short intervals; say every two or three hours during the day, would suit in most cases, than to only feed him two or three times a day. In very low cases the patient should be kept absolutely in the recumbent posture so as to favor the weakened heart as much as possible.

The feet should be carefully noticed by the nurse and always kept warm. This favors the heart When the physician allows the patient to sit up for the first time, the nurse should carefully attend to him, for often they become fainty, and should at once be placed down.

With the proper care from the nurse the disease can generally be kept from spreading, by the proper disinfection and the disposal of the discharges. The chief danger of spreading is from the discharges of the bowels, as the disease is essentially a bowel disease. Their discharges are often swarming with micro-organisms that cause the disease.

The bed chamber should always contain an antiseptic solution which should not be emptied under an hour after the patient makes use of the

chamber. After the nurse handles the chamber she should immediately bathe her hands in an antiseptic solution prepared for the purpose. Bad cases require bed clothing to be changed every day. The disease is oftener seen in persons from ten to forty years old than in any other age; though children and old people sometimes have the disease. It is less dangerous in children than it is in adults.

The surroundings and the water should be carefully examined by the physician and such directions followed as he may direct.

THE NURSING OF INFLUENZA OR LAGRIPPE.

In the nursing of Influenza at the beginning of the disease a dose of a mild purgative may be given. A warm bath is also a good thing. It should be managed in such a way that the patient will not take cold. He should rest under covering after taking a warm bath, and some hot drink administered that will sweat the patient often relieves him greatly and appears to lessen the severity of the attack. When the attack is even mild it is best for the patient to rest in bed to prevent complications.

If the patient has an appetite he may be allowed most any nourishing wholesome diet. Should his appetite be poor, milk and broth will be sufficient. In some cases there is a high fever with influenza. In such cases the ice cap should be had recourse to. Once a person has had this disease they appear to be very liable to it again. In prolonged attacks of this disease it is well for the patient to change rooms as he may reinfect himself if he is

not isolated. He can easily convey it to someone else, as the organisms are in the sputa.

Pleasant surroundings and a cheerful nurse are very desirable in this disease for the patient often suffers from depressed spirits. After the attack is over the patient is often very much debilitated; for that reason he should be well nourished and rather slow to resume his occupation.

To aid the skin in its eliminative function, bathing should be frequently resorted to. The disease goes lighter with children than with grown people. with the exception of very delicate young babies. In stout robust persons it might be regarded as nearly free from danger; but in old persons it is frequently fatal; usually assuming the type of a low fever with a bronchitis associated, and cold weather swells the mortality list among the aged; especially in the large cities, to a very considerable degree.

THE NURSING OF PNEUMONIA.

In Pneumonia the nurse should carefully observe the expectorations of the patient in the absence of the physician, and report to the physician as to their character, for it is very important that this be done.

Pneumonia patients are apt to perspire very freely. The nurse should take a dry soft towel and remove this perspiration often, as a great deal of impurities are reabsorbed if allowed to remain on the skin. The clothing should be changed often and the patient kept comfortably warm. The room should be well ventilated, for a stifling ill-ventilated room often does great harm in a disease of this nature.

On no account should the feet be allowed to get cold, for cold feet has a great tendency to weaken the heart. The temperature of the room should range from 70 to 80 degrees. The room should not be allowed to be crowded with visitors. Talking and every form of excitement is decidedly against the patient. In this disease the heart has a great extra work thrown on it; and anything that tends to weaken the heart is against the recovery of the patient. In severe cases the head should not be raised for any purpose.

In regard to the diet, milk and animal broths are the main dependence.

This disease at the present day is regarded as infectious, and the germs of infection are in the sputa of the patient, and the safest plan would be to disinfect the sputa or cloths that are used to spit on should be burned before they get dry. When the sputa becomes dry it is easily pulverized and often floats around as dust, laden with germs, and may be inhaled by others.

The crisis or turning point of the disease is about from five to nine days, and this always takes place very abruptly. I saw a patient once with a temperature of 104 breathing at the rate of about 60 times a minute, and exceedingly restless in the fore part of the night, and next morning at sun up the fever was all gone and the patient resting very easy, and the patient recovered. It had been a typical case of pneumonia.

In healthy adults the disease is usually recovered from, except in cases where there is an unusual amount of lung involved. It is more dangerous in young children but in old age it is truly a fatal

disease; for in true pneumonia a man over sixty does not often get over it.

THE NURSING OF SMALLPOX.

In all cases of smallpox where it is possible, the patient or patients should be placed in a hospital of some description; but if the sufferer has to be cared for at home strict precaution should be taken. The patient should be isolated and have no visitors except a nurse. The poison exists in the secretions and the excretions of the patient, and is exhaled from the lungs and skin. It is also in the dried scales, and is scattered all over the room the patient stays in. It becomes attached to furniture, clothing, etc.

The patient should be strictly quarantined; should have a good comfortable airy room. When the fever runs very high it should be reduced by cold sponging. If the patient has much headache an ice cap may be applied. Ice-water and ice-lemonade are good drinks. The care of the eyes is very important. They should be bathed several times during the day with warm water. The eruptions sometimes appear abundantly in the hair or on the scalp. To prevent matting, the hair should be cut short.

Cleanliness should be rigidly enforced. In order to prevent itching of the pustules on the face, the face may be anointed with glycerine or vaseline. If the patient has a good appetite the diet may consist of milk, eggs, animal broth and oysters.

During convalescence the patient should be bathed once daily, and it is not safe for those that have not had the disease to be in contact with him until

the skin is perfectly clean and smooth. Varialoid or modified smallpox is the disease in one who has been vaccinated. It runs a very mild course, and very generally terminates in recovery, and seldom leaves any scars on the skin. It, however, is contagious and is subject to the same quarantine rules as unmodified smallpox.

CHAPTER IX.

WHAT TO DO IN CASES OF POISONING.

The first thing to do is to send for a physician. Often much may be done before the physician arrives. In all cases of poisoning it is of the utmost importance to get the poison out of the stomach before it enters the system. This can often be accomplished by the administration of something that will cause immediate vomiting.

As quickly as possible a teaspoonful of table salt and a teaspoonful of mustard should be dissolved in a half glass of water and poured down the patient's throat, and repeated every fifteen minutes, until the stomach is thoroughly washed out. After this induce the patient to swallow the white of a raw egg, then a cup of strong coffee should be given. While each poison has special methods of treatment, immediately after the poison is taken, an emetic is highly useful before the poison enters the circulation.

The after treatment of poisoning is highly important, and when the physician arrives the case should be turned over to him.

I will here give antidotes for some of the most common poisons.

For all the acids, alkaline substances should be given. In the absence of anything else a solution of lime or even plaster will neutralize acids. Common soda or soap suds are alkalies, and will neutralize acids. Either one of which is most convenient

may be used. After the alkalies are given freely in the case of acid poisons, the whites of raw eggs swallowed is highly useful to protect the stomach. In case the patient grows very weak, stimulants may be necessary. An ounce of whiskey or brandy for an adult may be allowed.

Prussic acid or hydrocyanic acid is one of the most powerful poisons known. It kills so quickly in many instances, that there is no time for treatment.

Peach nuts and bitter almonds contain prussic acid, and if eaten in sufficient quantity will produce symptoms of poisoning. In this case emetics or something to vomit the patient, as stated above, should be given speedily. Where the pure acid is taken there is rarely any time for emetics. Dashing cold water on the head, giving whiskey or brandy or by the injection of coffee into the bowels, or by inhaling of ammonia, comprise all the remedies that are likely to be of any avail.

Aconite is a powerful poison. Merely tasting of some of the strong tinctures has caused death. The alkaloid obtained from it is an exceedingly powerful poison. 1-25 of a grain is regarded as a fatal dose. When either one of these poisons are taken into the stomach, the emetic of mustard and salt should be immediately administered and repeated every fifteen minutes until the stomach is thoroughly washed out. The patient should remain lying down and not be allowed to get up for hours after the poison is taken. His feet should be kept warm; brandy or whiskey should be given.

In the case of poisoning by alkalies, acids should be given in a diluted form.

Thus supposing a person to swallow potash or concentrated lye, vinegar will neutralize it. The vinegar should be diluted a little; about half water, and the patient allowed to drink say about a half glass. Lemon juice in the absence of vinegar will neutralize it. This should be followed by a dose of sweet oil or butter.

Arsenic is a powerful poison. Two grains have proved fatal to an adult. Rough on rats and paris-green both contain arsenic. The salt and mustard emetic should be given at once. Then mix baking soda and tincture of chloride of iron together and give it freely. One tablespoonful will do no harm. Camphor in very large doses is poisonous. The salt and mustard emetic is to be given, followed by strong coffee.

Corrosive sublimate is a powerful poison. The white of an egg should be immediately given for this poison, and then the salt and mustard emetic.

Opium and its various preparations, such as laudanum, paregoric and morphine, are powerful poisons. The emetic of salt and mustard should be given, and repeated often until the patient vomits freely; then give plenty of strong coffee. A little whiskey is also good. The patient should be kept awake and cold applications applied to the head. Nothing should be done to exhaust the patient. Slapping and pulling and walking him around are all to his disadvantage.

Phosphorus poisoning is sometimes met with in children who have eaten the heads of matches or tasted of insect destroyers, both of which contain phosphorus. The antidote is ordinary turpentine. The turpentine may be given in as many drops as

the patient is years old up to 20 years. It may be taken in barley water or gum arabic water. It may be taken every fifteen minute until four or five doses are given. Oils and fats must not be given. Sulphate of magnesia should then be given as a purge.

Strychnine, sulphate of strychnine, and nux-vomica are all powerful poisons. One half a grain of strychnine has proved fatal to an adult.

SYMPTOMS OF STRYCHNINE POISONING.

The body is twisted in all directions, the teeth are clenched, and the patient has convulsions. The salt and mustard emetic should be given at once, and repeated every fifteen mintues until the patient vomits freely.

DROWNING.

In cases of drowning the patient should be laid across something, as a log, with his face and head downward to encourage the water to run out at the mouth. After the water has run out of the mouth it should be cleansed. To excite breathing the patient should lie on his side with his head supported. Should no success follow this procedure artificial respiration may be tried by Sylvester's method; then the extremities should be gently rubbed and warm applications applied. This treatment should be persisted in for some little time. Should it succeed the patient should be placed in a good warm bed and kept there until he fully recovers.

SUN STROKE.

In sun stroke the face is red and the skin is hot, and the patient usually has a high fever. The

patient should be immediately removed to a cool shady place. The clothing should be loosened, and cold applications kept to the face comprises the treatment.

HEAT EXHAUSTION.

The face is pale and the skin cool, which is quite the opposite to sun stroke, and the treatment should be the opposite. The patient should be laid with his head low, and if he is able to swallow he may have a little drink of whiskey, and hot applications to his feet and a blanket spread over him comprises the treatment.

NERVOUS PROSTRATION.

This should be treated with a great deal of tact. The patient is usually crushed in spirits, and his will-power very much weakened. His nurse should encourage him and always be cheerful in his presence. His food should be nourishing and easy of digestion. His appetite should be flattered. Fats being very essential to the nerve centers, butter should enter largely into the diet.

HOW TO TREAT A WOUNDED ARTERY.

The blood from a wounded artery spurts out in jets. The color is a bright red. Pressure should be made immediately between the heart and the seat of the wound. A knot may be tied in a handkerchief, the knot placed on the artery and the handkerchief tied around the limb as tight as it can be tied. The limb should be elevated. If the artery lies near a bone the flow of blood may be arrested by pressure of the finger against the wound, In case quite a small vessel or a number of small

vessels be wounded, hot water of 180 degrees may be applied by dipping cloths of gauze into the water and applying to the wound, until the physician arrives.

HOW TO TREAT A CUT FINGER.

The wound should be thoroughly cleansed and then dipped into very hot water. A soft cloth soaked in turpentine makes a good dressing.

HOW TO TREAT A BLEEDING NOSE.

The head may be wet with cold water at first. Should it not cease to bleed a little tampon of cotton rolled up until it is firm that can just be pressed up into the nostril should be applied; and if it is pressed far enough back it will very generally succeed. In cases of protracted bleeding this tampon should be allowed to remain three or four days.

BURNS.

When burns are not sufficiently serious to require the services of a physician they may be dressed with olive oil or linseed oil, and a wet cloth should be applied. Burns caused by acids should be treated by the application of alkalies. Baking soda in solution is a good application.

The danger of a burn is generally more according to the extent over the body than its depth. Just mere scorching the skin over half the body is very generally fatal.

IN CASES OF CLOTHING ON FIRE.

Carpets, rugs, or yarn blankets thrown around the patient will often smother the flames.

IN CASE OF A FISH BONE IN THE THROAT.

The patient may swallow a raw egg and the bone will frequently be dislodged. Should this fail a handkerchief wrapped around the finger may be passed into the throat and hang the bone and bring it out.

IN CASES OF PERSONS STRANGLING.

The swallowing of the white of an egg will generally relieve him, unless the obstruction is in the windpipe.

IN CASE OF A CHOKING CHILD.

A good way to relieve it is to hold it by its heels and shake it, and the foreign body will fall out of its mouth.

Should an insect get into the ear a little oil of any kind will drown it out. The ear should then be washed out with warm water. As the poison of the insect is usually acid, alkali will usually neutralize it. Common baking soda applied in a strong solution is a good application.

IN CASES OF SNAKE BITES.

Common table soda should be freely applied in a strong solution; or in the absence of this, lime may be wet and applied to it.

In injuries of the eye, such as particles of dust, can often be removed by flushing of the eye with clean warm water. Where the injury is from an acid an alkali like common baking soda in strong solution should be applied.

In cases of small foreign bodies lodging in the conjunctiva it often can be removed by gently rubbing a piece of raw cotton over the eyeball.

For removing sun tan, a very good application is equal parts of glycerine and lemon juice.

To relieve tired inflamed feet, soak the feet in warm water and dry them, and then bathe them in alcohol. This toughens the skin of the feet and proves a very good remedy.

To relieve ear ache pour as warm water as the patient can bear into the ear. Repeat this several times and wrap the ear up with dry flannel.

In case of frost bites, immediately after the bite the parts should be rubbed with snow or ice water. Heat should not be applied at once. But for the annoying effects of the bite, hot water gives relief.

For common colds the feet may be bathed in hot water, and for adults as much as ten grains of quinine may be given just before going to bed. This will usually sweat the patient and relieve him some.

FOR CHRONIC RHEUMATISM OR RHEUMATIC PAINS.

Where the patient does not suffer from loss of appetite nor indisposed enough to go to bed, the following is good treatment:

The patient should wear flannel next to his skin, and warm clothing in damp and cold weather, and never allow himself to get wet, and should apply hot water to the parts affected, and keep his bowels free with simple purgatives.

FOR PILES OR HEMORRHOIDS.

The patient should never allow his bowels to become constipated. He should bathe with a

solution of common soda and hot water, and then anoint with glycerine.

A GOOD WAY TO RELIEVE CONSTIPATION.

Take an injection of olive oil every three or four days. A half pint injected very slowly into the bowels from a fountain syringe will often give considerable relief. The patient in taking this injection should lie upon his side and he should then turn after a few minutes on his back, and then on his other side, and then back on his back, and then on his other side. The reason for assuming these positions is that the oil may find its way around into the curvatures of the bowels.

FOR PROLAPSED OR FALLING BOWEL.

First bathe the parts in warm water, then anoint with olive oil, then dip a folded towel into warm water and exert gentle but persistent pressure upon the bowel and it will very generally succeed.

In treating of ringworm, something should be used to kill the parasite, and this can generally be done with bichloride of mercury. Two or three grains should be dissolved in a half a pint of warm water; then with a soft rag dipped into this solution, bathe the ringworm. Three or four applications will generally succeed.

FOR SHINGLES.

The parts diseased should be painted with collodion. This relieves the pain by excluding the air and prevents the clothing from irritating the parts.

For the cure of corns on the feet, with a sharp knife pare off the hard part of the corn and apply a drop of nitric acid with a little glass rod or stick. This will usually cure the corn.

TO PREPARE EPSOM SALTS SO THE STOMACH WILL NOT REJECT THEM.

Put a tablespoonful in a glass, then fill the glass half full of boiling water. After stirring well pour off the liquid and throw away the sediment. Now add a little lemon juice and allow the mixture to cool. Now fill the glass with cold water. The dose can now be taken.

CHAPTER X.

PREPARATION OF FOOD AND DRINK.

As the preparation of foods and drink for sick people is very important I will here quote the preparation of a number of them that will be found very useful in nursing. The quotation is made from a hand book on nursing prepared by S. Virginia Levis M. S. N.

"*Barley Water*—Add one tablespoonful of pearl barley to one and a half pints of water; boil down to one pint and strain through muslin. Add salt, sugar or lemon juice; or if desired to increase its nutrition, employ the whites of two eggs.

Rice Water—Follow directions for making barley water.

Plain Whey—Heat a half pint of milk luke warm and add one teaspoonful of the essence of pepsin; beat with a fork until the curd is finely divided, then strain.

Albumenized Water—Into a quart jar place one cup of cold water, the white of one egg, one tablespoonful of lemon juice and one tablespoonful of sugar; blend them thoroughly by shaking.

Albumenized Milk—Place the white of one egg and one half pint of milk in a quart jar and shake them together.

Lemon Whey—Bring half a pint of milk to the boiling point; remove from the fire and add juice of a half a lemon; stir once or twice and strain; add two teaspoonfuls of sugar.

Tamarind Whey—Stir one tablespoonful of tamarinds into a half a pint of milk while boiling; strain and sweeten to taste.

Orange Whey—Proceed as for lemon whey, substituting the juice of one or two sour oranges with a piece of the peel.

Wine Whey—Bring a half pint of milk to the boiling point and pour into it four tablespoonfuls of sherry wine; stir once or twice and when the curd separates remove from the fire and strain, sweetened with one teaspoonful of sugar.

Egg Nog—Beat thoroughly the yolk of one egg with one tablespoonful of sugar, then stir these with well beaten white; now add either one pint of milk and one tablespoonful of sherry wine, or one tablespoonful each of ice water, milk and wine.

Plain Junket—Heat a half pint of milk merely luke warm; sweeten and add one teaspoonful of the essence of pepsin. Stir only enough to mix thoroughly and pour into cups. Let these remain in a warm place until set; then place on ice.

Cream Junket—Proceed as for plain junket, substituting cream for milk. A little tart jelly may be placed on top.

Egg Junket—Shake together in a jar one egg with a scant half pint of milk; one or two teaspoonfuls of sugar and a little salt. Turn into a sauce pan and heat until luke warm, stirring constantly; then proceed as for plain junket. Flavor with vanilla or other extracts.

Coffee Junket—Mix 1¾ pints of milk, one-half pint of strong coffee, and a half a cup of sugar; heat until luke warm and finish as a plain junket. The top may be heaped with whipped cream.

Chocolate Junket—Heat one quart of milk luke warm; add a half cup of sugar and stir until dissolved. Melt two squares of chocolate in a half a cup of the warm milk, and boil a moment; carefully add to it the remainder of the milk with one teaspoonful of vanilla. Finish as in plain junket It may be served with sweetened cream.

Wine Junket—Add two tablespoonfuls of sugar to one pint of milk, which must be heated nearly luke warm; add one tablespoonful or more of sherry wine, with a little nutmeg, and proceed as for plain junket.

Mulled Wine—Place a clove and a little piece of cinnamon in a half cup of boiling water, and continue to boil a few minutes. Take out the spices and add four or five tablespoonfuls of port wine; allowing the mixture to reach the boiling point, pour this over one well beaten egg and sweeten to taste.

Wine Posset—Boil two or three slices of bread in one pint of milk; when soft remove it from the fire adding nutmeg and two teaspoonfuls of sugar. Pour this slowly into six or seven tablespoonfuls of Madeira or other wine.

Wine Jelly—Soak one box of gelatine in one half pint of cold water for two hours; then pour in one and a half pints of boiling water, stirring well. Add the juice of one lemon, one pound of sugar and one pint of sherry wine; strain and turn into cups or molds. When cold place on ice.

Grape Jam—Wash the grapes and take out the pulps; place the pulp and skins in separate vessels and cook until tender. Put through a colander to get rid of the seed. To each pint of pulp allow

one pound of granulated sugar; allow another pound for each pint of skins; the juice must be pressed well from the skins; put pulp juice and sugar together and boil until thick; add the skins and boil two minutes; remove from the fire and empty into sealed jars.

To Sterilize Milk—Place the milk in a glass vessel having a wide mouth, covering the opening with a piece of absorbent cotton or cheese cloth; place it upon the stove in a pan containing cold water and remove the moment the water reaches the boiling point; cool it rapidly. An Arnold steam sterilizer is excellent for this and similar purposes.

Kumiss—Dissolve in one third of a cake of compressed yeast one tablespoonful of warm water, or substitute other yeast; add one tablespoonful of sugar to one quart of fresh milk and heat until blood warm; stir in the yeast and empty into tightly corked bottles; stand the bottles upright in a warm place over night where the thermometer registers 70 or 72 degrees; then place them on their sides in an ice box; this will keep good and sweet for almost three days.

Peptonized Milk—Regular Process. Place one tube of peptonizing powder in a quart preserving jar along with a half pint of cold water; shake well and add one pint of cold milk; heat some water luke warm and standing the jar in the bath allow it to remain fifteen minutes. Unless correctly prepared milk will acquire a bitter taste.

Peptonized Milk—Cold Process. Place one tube of peptonizing powder with a half a pint of water in a quart jar; shake together and add one pint of cold milk; place at once on ice.

Peptonized Milk—Quick Process. Proceed the same as for the cold process, but instead of placing at once upon ice turn it into a sauce pan and allow it to come to the boiling point.

Peptonized Milk—Special Process. Into a quart jar place the contents of one peptonizing tube with one half pint of cold water; after shaking well add one half pint of cold milk; heat some water luke warm and allow the jar to remain in this water bath for one hour. placing the bath where it will keep luke warm; then pour it into a sauce pan and bring it to the boiling point in order to stop for the peptonizing; milk so treated can be used for lemonade and punches as it will not curdle.

Milk Lemonade—In a goblet put a little crushed ice and the juice of a lemon; sweeten to taste and fill the goblet with cold milk which has been peptonized by the special process.

Punches—Add an equal part of mineral water to cold milk which has been peptonized by the special process, or to one glass of the special peptonized milk add one tablespoonful of brandy or other liquor.

Lemonade Flip—Beat together three teaspoonfuls of sifted sugar and one fresh egg; add the juice of one lemon to three fourths of a glass of water; then add this to the sugar and egg, beating all the while.

Modified Cream—To a half a glass of fresh cow's cream add an equal quantity of pure water and sweeten to taste.

Arrow Root–Mix one teaspoonful of Bermuda Arrow Root with a little milk and stir this into a half pint of boiling milk; sweeten to taste and add

a pinch of salt; flavor with nutmeg or one teaspoonful of brandy.

Arrow Root Pudding—To one quart of boiling milk and three and one half tablespoonfuls of arrow root, which has been dissolved in a little cold milk, add one cup of sugar and in a few minutes take from the fire; into this stir four beaten eggs and a little nutmeg and cinnamon or other flavoring; pour into a well buttered vessel and bake for a half an hour in a quick oven; a few minutes before taking from the oven sift two tablespoonfuls of sugar over it and set it back to glaze.

Farina Gruel—Moisten one tablespoonful of farina with a little cold water; stir this into a cup of boiling water and let it cook for ten minutes; then add one cup of milk, a pinch of salt, and one or two teaspoonfuls of sugar and let it boil one minute longer.

Milk Toast—Place a large slice of stale bread in the oven to dry. Toast it evenly and moisten it with a little boiling water; pour over it about a cupful of boiling milk thickened with flour, and to which has been added a small piece of butter and a pinch of salt.

Graham Cream Toast—Toast one or two slices of Graham Bread; bring about one cupful of rich cream to the boiling point. Add a pinch of salt and pour over the bread which has previously been buttered.

Gluten Bread—To one pint of scalded milk add a teaspoonful of salt, and when luke warm add half a yeast cake, or substitute other yeast; dissolve the compressed yeast in about two tablespoonfuls of warm water; stir in about one pint of gluten flour

and the beaten white of one egg. To make the batter sufficiently thick it may be necessary to add more flour. After beating well turn into a greased pan; cover it and stand it in a warm place to raise; when about double its bulk, bake for one hour or longer in a moderate oven.

Oatmeal Gruel—Soak for five minutes one tablespoonful of rolled oats in three tablespoonfuls of cold water; add one and one half pints of scalding water and boil for half an hour; it may be strained or not, after which add a half pint of milk, return to the fire and bring to the boiling point; add a pinch of salt after removing from the fire and sweeten or not, as desired; nutmeg may be added.

Cracker Gruel—Moisten two tablespoonfuls of cracker crumbs with a little cold milk; stir this into a kind of boiling milk and cook five minutes, stirring constantly; then add a pinch of salt; also a little cinnamon if desired.

Rebecca's Food—Place in a bowl several soda crackers over which has been shaken a pinch of salt, sugar and cinnamon to taste; pour over them two or three times as much boiling water as would be required to cover them to allow for swelling.

Soft Boiled Eggs—Carefully drop the eggs into boiling water and immediately remove the vessel from the fire and allow the eggs to remain in the water for four or five minutes.

Egg Omelet—Beat together the yolks of two eggs and four tablespoonfuls of milk; add a pinch of salt to the whites and beat them very stiff; mix all together and turn into a hot well greased sauce pan; brown quickly and fold over once.

Eggs on Toast—Put some water on to boil in a

shallow sauce pan and place a slice of stale bread into the oven to dry; break an egg into the boiling water, and while it cooks toast the bread; butter the toast, sprinkle salt over it and lay it on a plate; when the egg is merely cooked through, place it on the toast, and moisten the toast with a little of the boiling water in which the egg has been cooked.

Soft Custard—Put a half a pint of milk on the stove to scald; beat one egg, yolk and white together, add to it one and a half tablespoonfuls of sugar and a pinch of salt; pour slowly into this mixture the scalded milk, stirring constantly; return to the fire and cook for two or three minutes; then flavor with wine or some flavoring extract.

Egg Custard—Break the yolk of one egg into a cup and add to it one or two teaspoonfuls of sugar; add a pinch of salt to the white and beat it well; then add this to the yolk and sugar; fill the cup with milk, stir well and bake until the top is brown; nutmeg or any flavoring may be added if desired.

Corn Starch Pudding—Dissolve one and a half tablespoonfuls of corn starch in a little milk; add two well beaten eggs, one and a half or two tablespoonfuls of sugar and a pinch of salt; gradually add the mixture to one pint of milk which has been brought to the boiling point, and boil about four minutes, stirring briskly; remove from the fire and add in the desired flavoring.

Corn Starch Blancmange—Dissolve two table spoonfuls of corn starch in a little milk and add two tablespoonfuls of sugar and a little salt; stir the mixture into one pint of boiling milk and cook four minutes; remove from the fire and flavor with lemon, nutmeg or whatever is preferred.

Tapioca Pudding—Soak one tablespoonful of pearl or flaked tapioca for two hours in a cup of cold water; cook until clear, then add a half pint of milk and the yolk of one egg beaten with a half a cup of sugar and cook for about ten minutes until thick; remove from the fire and stir in the well beaten white of the egg, adding nutmeg or vanilla.

Fruit Sauce—Mash one pint of strawberries or other fruit to a pulp; stir in a half a cupful of granulated sugar, and let the mixture stand for an hour and a half or longer; then stand the dish and contents in a pan of boiling water and let it come nearly to the boiling point. This may be served with blancmange, boiled rice or almost any pudding.

Rice Pudding—Into quart pudding dish put a half a cupful of well washed rice; one and a half pints of milk, nearly one cup of sugar, a large pinch of salt, and nutmeg or other flavoring; bake in a moderate oven for two hours, stirring at intervals during the first hour; to be eaten cold, with or without cream.

Rice Meringue—Cook four tablespoonfuls of rice until very soft; add a small piece of melted butter, a half a pint of milk, the yolks of two or three eggs, a little salt, and lemon juice or other flavoring; pour into cups a little more than half full; set them into a pan of boiling water and bake fifteen minutes; beat the white of the eggs with sifted sugar; place on top of the custards and place back in the oven to brown slightly.

Sago Pudding—Put two tablespoonfuls of pearl sago in one cup of cold water to soak over night add one pint of milk and set on the stove to scald; add the beaten yolkes of two eggs and two thirds of

a cup of sugar and boil a few minutes; take from the fire and add a pinch of salt and vanilla or other flavoring; then pour slowly over the stiffly beaten whites of the eggs.

Orange Sago—Soak one cup of sago in three cups of water over night; add one or two tablespoonfuls of sugar and cook until clear. While hot pour this over three or four sliced oranges and set away to cool.

Irene's Pudding—Bring a half a pint of milk to the boiling point and thicken it slightly with corn starch or flour, then add one tablespoonful of sugar, a well beaten egg, a piece of butter and salt to taste; remove from the fire and flavor with vanilla; while hot pour this over small pieces of sponge cake or slice peaches; when cool set on ice.

Farina Custard—Moisten two tablespoonfuls of farina with a little cold milk; add to one pint of boiling milk and cook five minutes; stir in two well beaten eggs, three tablespoonfuls of sugar, and a little salt, and cook a minute longer. Remove from the fire and add any desired flavoring.

Hasty Pudding—Mix until smooth, one tablespoonful of flour, a pinch of salt and a little milk; add this carefully to one scant pint of boiling milk; stirring constantly; remove from the fire when thick. It may be eaten hot with sugar or butter.

Baked Tapioca Pudding—Soak two tablespoonfuls of tapioca in a half a pint of cold water over night and cook until soft; when cool add one quart of milk, three or four well beaten eggs, one cup of sugar, some salt and flavoring; bake about three fourths of an hour.

Raisin Custard—Add a small handful of seedless

raisins to one pint of milk and cook gently for about twenty minutes; dissolve one teaspoonful of corn starch in a little cold milk; add this with two teaspoonfuls of sugar and a pinch of salt, to the hot milk; cook two minutes longer.

Bread Pudding—To one quart of cold milk add six or seven tablespoonfuls of sugar, a little salt, and four or five well beaten eggs; also a few slices of stale bread cut into small squares and buttered; bake until firmly set and the bread is brown on top; test with a knife blade. If desired a thick layer of slightly mashed and well sugared strawberries may be placed on top, and the pudding returned to the oven for a few minutes longer.

Apple Whip—Cook two apples until soft, drain and pass through a colander; sweeten to taste, add the whites of one or two beaten eggs, whipping together until smooth.

Fruit Foam—Beat the white of an egg to a stiff froth and add two teaspoonfuls of powdered sugar and one tablespoonful of fruit juice; briskly beat all together.

Fruit Fluff—Beat the yolks of five eggs with a cup of sugar and add a half a pint of mashed strawberries or other fruit, together with the juice of a lemon; cook merely long enough to thicken, then stir in the stiffly beaten whites; put into tumblers and set on ice.

Clam Broth—Take a half a dozen unopened clams; thoroughly scrub the shells and drop into sufficient boiling water to cover them; cook until the shell is open and strain the liquor. A dash of red or black pepper, or three or four drops of the tincture

of capsicum may be added to each cupful of the broth.

Clam Soup—For obtaining the liquor, follow the directions as given under the heading of Clam Broth; season to taste, and add an equal quantity of scalded cream or milk, with crackers and nutmeg if desired; boil a few minutes.

Sweetbreads—Soak for one hour in cold water and parboil for fifteen minutes in salted water; place them again in cold water for a few minutes and remove the skin; place on ice until ready to cook. Cut them half lengthwise and broil.

Cream Oysters—Mix one tablespoonful of flour with a little cold milk and stir into one pint of boiling cream; allow one pint of oysters to come to a boil in their own liquor; reject the liquor, turn the oysters into the cream, and season to taste.

Oysters on Toast—Cook a half a dozen oysters in their own liquor until they swell and are heated through. If they are cooked longer than is necessary they will be tough. Toast a slice of stale bread; butter it, moisten it with juice, and lay the oysters on top.

Oyster Soup—Scald a pint of milk then add the oyster juice and bring to a boil. Season to taste and add the oysters, removing the soup from the fire when the edges of the oysters begin to curl.

Potato Soup—Into one pint of milk and a half a cup of water place two small potatoes cut into slices or small cubes; also a stalk of celery cut fine; one half tablespoonful of butter, and a half a chopped onion if desired. Boil a half an hour and season to taste.

Invalid Soup—Soak one tablespoonful of pearl

sago in one cup of cold water for ten minutes and cook until perfectly tender and well thickened; bring a half a pint of milk or a fourth a cup of cream to a boiling point and add to it one well beaten egg; now add the sago and one pint of hot beef tea, mixing all well together.

Tomato Soup—Mash two or three large ripe tomatoes and press through a fine sieve to get rid of the skin and seeds; to the express juice add a little water to allow for evaporation and boil for fifteen minutes; then add half the quantity of milk slightly thickened with flour, a piece of butter, and seasoning to taste, and bring to a boil.

Beef Juice—Slightly but quickly broil a piece of juicy steak; cut it into convenient squares and place in a lemon squeezer; express the juice into a warm cup and season it to the taste; or flavor with a little wine, whiskey, brandy, or vanilla, and freeze.

Beef Tea—Take one pound of beef, reject all the fat and cut it into very fine pieces; soak it in one pint of cold water for two hours; heat it very gradually; then allow it to gently simmer for about ten minutes; do not boil it; season to taste and strain.

Mutton Broth—Wash one pound of lean mutton; place it in one pint of cold water with a little salt and one tablespoonful of pearl barley or rice; boil gently for two hours and skim.

Chicken Broth—Cut up the fowl and soak it for one hour in salt and water; boil it gently until the meat shrinks from the bones; take out the chicken and salt the broth; add rice or barley and continue cooking until tender; stir one cupful of hot milk into

two beaten eggs and add this to the broth and bring to the boiling point and strain.

Cocoa—When too much cocoa is used it will impart a bitter taste; a half a teaspoonful of the powder will usually be sufficient for one cup. It is not necessary to previously mix the powder with cold water; simply sprinkle it on top of the milk after it has been set on the stove. When the milk is luke warm stir it in. Cocoa will not thoroughly dissolve in a cold medium, and will lump in a hot liquid. Boiling for two or three minutes will improve the flavor. It is more nutritious when made of all milk, 'though a little water might be added to allow for evaporation.

Flax Seed Tea—Pour one pint of boiling water over one ounce of whole flax seed and a little pulverized liquorice root; let this set on the cool part of the stove for about four hours, then strain and place it on ice. Lemon juice may be substituted for the liquorice.

Fruit Juice as a Drink—Fill a glass two thirds full of cold water sweetened to taste and add the juice of currants or other fruits in whatever quantity desired; a little jelly may be substituted for the juice.

Apple Water—Wash and core one large apple, retaining the peel; slice it into a sauce pan and pour over it one pint of boiling water. Keep it covered and cook gently for about twenty minutes; strain and add sugar to the taste; nutmeg may be added if liked.

Orangeade—Pour a cup of boiling water over the rind of one sour orange; add two teaspoonfuls of

sugar, and when cool add the juice and strain and set on ice.

Pine Apple Water—Peel one large pineapple, then slice it and pound it to a pulp; pour over it one pint of boiling syrup, add the juice of a lemon and an orange, stir well and let it set for two hours, then strain and add one quart of pure cold water.'

CHAPTER XI.

DRUGS MOST COMMONLY USED BY THE PUBLIC.

From time immemorial medicines and drugs have been made use of by the general public. Ages ago they used decoctions and infusions—or in other words they boiled their herbs, bark and roots, and it would appear that even physicians had no way, or at least used no process to have any definite strengths for the medicines they used. Their doses were consequently indefinite, and in case of poisonous medicines it was not at all unlikely that harm often resulted; and at the present day the people make use of a great many official medicines without knowing the proper dose. It would probably be the best if all the drugging business or the administration of medicines was turned over to the physician; but that is not the case, for all classes of men are more or less given to prescribe for themselves at times. Many of them use proprietary and patented medicines. Of these I know very little, but of the official medicines, that are official in the pharmacopiea, that are used by the public, I have some knowledge. As the people will use them I think it best they should be enlightened as to their nature, the effects and dosage.

HYDRARGYRI CHLORIDUM MITE.

Mild chloride of mercury commonly called calomel is prepared from mercury and chloride of sodium or common salt.

It is a dull white, heavy powder, permanent in the air, odorless, with little or no taste. It is insoluble in alcohol and water.

The authorized dose for an adult is from one-half to ten grains. In children it is often given in too small doses though little children can often take much larger doses than are generally used, with advantage. A child a year old can bear a grain of calomel very well, and one two years old can bear two grains; and it usually takes that amount at least; to give them an ordinary purge. These doses last referred to can be increased about a half a grain to the year of the age of the child. It is proper to give it on a fasting stomach. It is not a very dangerous drug except it be continued for a number of doses. It should be given on a fasting stomach and allowed to work off before the patient eats.

In the case of adults from eight to ten grains is a fair dose for a purgative effect.

It was once thought to be a drug capable of breaking fevers, but investigations have shown that it is not capable of breaking any continued fever. Under the impression that it would arrest the progress of fevers physicians of past generations often used it in small doses at short intervals, for days and weeks, with the result of salivation and sometimes loss of the teeth, and a weakening of the constitution. When used in this way it impairs the constitution by dissolving the red corpuscles of the blood and weakening the patient generally.

One of the main uses of calomel is its stimulation to the secretions, and its cleansing effect on the stomach and bowels; and in suitable cases it hardly has any equal in this regard. A main important

point is that it should be taken in doses sufficient to produce a full purgative effect or be followed by epsom salts eight or ten hours later. It has an antiseptic action that makes it highly useful in the diarrheas of children, and I am satisfied I have seen several children saved by good sized doses of calomel that had suffered for months from this disease. It is not a drug to be taken continuously, but in certain cases it may be repeated two or three or four times; taking care that it be given in sufficient quantity to take good effect; and it is often very well to flush the bowels out after taking of it, with sulphate of magnesia.

Calomel has the power of lowering the temperature in a number of severe diseases of a febrile nature. This undoubtedly is due to its eliminating poisons from the system, that causes the elevation of temperature; and in this way given occasionally, proves useful, especially in the first stages of typhoid fever, pneumonia, billious remittent fever, simple continued fever, intermittent fever, pernicious remitttent fever, and yellow fever, and many other diseases. In common billiousness, inactivity of the bowels, foul stomach, and inactivity of the liver, a dose of calomel that acts freely is often highly useful.

Children bear the drug mighty well, and in diarrhea, cholera infantum, or constipation of little infants, a full dose of calomel often proves of the utmost advantage,

To get the beneficial effects of it the prescriber should see that it is fully worked off. It is not a very certain drug in its action, and should it not take effect in eight or ten hours the dose should be repeated, or sulphate of magnesia should be given

so that it should be eliminated from the system and secure its beneficial action. In adults it can often be combined with vegetable purgatives with a decided advantage. Three or four grains of aloes combined with eight or ten grains of calomel produces one of the most desirable cleansing purges in many instances, that can be produced by any drug. One drawback to calomel is that it is apt to make some people sick when they take it; and most persons in taking a large dose are more or less nauseated.

Intelligence and discretion should always be exercised in the use of this drug as in the use of any other drug; for when a drug is not positively indicated it not infrequently does harm by disturbing of the secretions. In most acute diseases a good calomel purge taken without food is not to be condemned.

Calomel acts upon the kidneys; and in cases of inactivity of those organs, or even in dropsy it sometimes proves highly useful; especially if the dropsy be of renal origin. Some persons are more readily affected by calomel than others. A single dose will slightly salivate some people, but not to a harmful extent.

I might here give some of the symptoms of salivation so anyone using it may guard against it.

Its first symptoms are sore teeth; often more or less slight looseness; spongy gums, an unusual flow of saliva, a fetid disagreeable breath, a bluish line along the margins of the teeth, then swellings of the glands about the jaws. As it advances the jaws and muscles ache, and the patient fevers up and emaciates; he often loses his appetite; he looks

pale, and his hair will fall out often; sores will form about the mouth; a diarrhea will supervene; the patient becomes nervous and trembling, and in women abortion; the teeth may fall out, and even destruction of the lips and part of the jaws. These last named symptoms are very severe, and are never produced by one or two doses of the drug.

In the first stages of Syphilis, calomel given in three or four grain doses once or twice a week is highly useful.

Calomel is incompatible with the chief part of the materia medica. With aloes, rheubarb, and podophillin it goes very well. It should not be given with the acids nor iodide of potassium.

POTASSII IODIDUM.

(or Iodide of Potassium)

This drug is prepared by dissolving resublimed iodine in a solution of caustic potash, and by evaporation with charcoal. As it is generally sold, it is in the form of cubical crystals, or a coarse white powder, It is very soluble in water. It has a disagreeable, strong saltish taste, and is a highly useful medicine. It is used a great deal by the people as well as by the physician. It is not a dangerous drug except when given in very large doses. In some persons it will cause loss of appetite, and in that case should be suspended from time to time and if it be necessary to continue the use of the drug, resumed again.

The authorized dose of the drug is from five to sixty grains. The best time to use it is after meals, largely diluted with water. It is a drug that may be used for weeks, months or even years where

strictly indicated, without harm. To lessen its disagreeable taste when the patient is taking large doses of it, it may be dissolved in water and an equal amount of syrup of hydriodic acid added to it, which has the same effect, and makes it much more agreeable to take; for in taking large doses the patient often gets very much against it. It is an exceedingly powerful drug in the management of syphilis, and it is not surpassed by any drug in its curative power of scrofula. It is also useful in chronic phthisis or tuberculosis of the lungs when that disease is of a chronic nature. Where the patient is not fevered up and quite a moderate amount of the lung involved, and the patient's appetite is good, it is one of the most useful drugs in this last named disease, that we possess. Of patients suffering from acute tuberculosis or fevered up, a large amount of the lungs involved, or bed-ridden, it is of little or no use. In many cases of chronic rheumatism by improving the functions of the glands, it is often highly useful.

It should be taken for weeks or even months, and in case of a relapse of the disease it should be had recourse to again. In some cases of Asthma it has a beneficial effect, and in some cases of Bronchitis it is highly useful.

In Conjunctivitis, Iritis, or other inflammation about the eyes produced by a scrofulous state of the system, it will do more good than any other drug with which I am acquainted. I here refer to scrofula, as that is the old name of it; but there can be no doubt that scrofula is a form of tuberculosis; not differing from tuberculosis of the lungs other than the tissues involved.

In taking Iodide of Potassium the patient may eat plenty of good nourishing food and drink freely of water; and if his appetite is poor he may take bitters to improve his appetite. This drug is incompatible with nearly every other drug in the materia medica except those of iodine. As before stated, it may be given with syrup of hydriodic acid, which has the same effect, or iodide of sodium, or iodide of ammonium, all of which have similar effects to iodide of potassium.

There are some little drawbacks to Iodide of Potassium. I have mentioned the effect on the appetite. It sometimes produces a little eruption, a sneezing, pains about the jaws, and a running at the nose.

In children of one and two years old, the dose should be about two grains three times a day, taken after meals, largely diluted with water; and one grain may be added to the dose for every year of the child's age until he becomes an adult.

CINCHONA OR PERUVIAN BARK.

There are several varieties of these barks. They all yield Quinine, The tree is a native of South America. There can be about twenty one alkaloids obtained from them; but there are only four of much value. Quinine, Quinidine, Cinchonine, and Cinchonidine. The preparation from this tree most commonly used is a salt from the alkaloid sulphate quinine prepared by the action of sulphuric acid on the quinine, and is called sulphate of quinine; the people also call it quinine. It is used extensively by the people as well as the physician.

QUININAE SULPHAS.

(Or Quinine Sulphate.)

The authorized dose of this drug by the profession is from one to twenty grains. In small children it may be given in from one half to two grains. It is not a dangerous drug, 'though if used in large doses it has a depressing effect upon the nervous system. It is largely used in the treatment of Malaria; especially of the intermittent type, and is the nearest an antidote we have. It should be given in large doses in intermittent fever. Usually three times a day is often enough to give it. It is very useful in billious remittant fever, though it will not arrest the fever at once. It may be given in moderate doses throughout the disease. It has the power of lowering the temperature in fevers generally, but as far as my experience has gone it is utterly useless in typhoid fever.

In influenza or Lagrippe, after a simple purge it is a very excellent remedy. In pernicious remittent fever it is our sole dependence. As a prophylactic against malaria, it is regarded as highly useful in all the malarial districts. Many persons use it when well to keep from having the disease in the low swampy Southern parts of the United States. It is largely used to break up colds. It is very doubtful whether it has this power or not, 'though it has a considerable power to give relief, and in this way benefits the patient.

Quinine is a good antiseptic. It has a good effect in Septicemia. It gives a good deal of relief in neuralgia. It is also useful in hay asthma or hay fever.

Some of the drawbacks to its use after the effects have passed off, large doses of the drug leave a loss of vision, but this is very generally temporary; the sight being restored soon after the quinine is left off.

Although quinine is not dangerous drug, it is used more than is necessary by the public.

SULPHUR.

Sulphur is an elementary body, and one of the few that is used in its elementary form as a medicine. A dose is from ten to sixty grains for an adult. Children under five years old can take a grain for each year of their age. It seems to be a remedy that has been used for ages, and not near so much as formerly; 'though there can be no doubt that it possesses some good medicinal properties.

It is a mild laxative when taken into the system. It is easily defused through the tissues, and will stain silver coins carried in the pocket.

Some of the diseases that it has been used in are chronic rheumatism. It no doubt benefits some cases. In scabies or itch, Sulphur applied locally kills the parasite. It should be mixed with some kind of an ointment; as lard or some oily substance; or in the form of sodium sulphite, 30 grains to the ounce of water used as a bath is very efficient in curing Scabies.

In acid indigestion sometimes Sulphur proves curative.

In gangrenous wounds, sulphurous acid is a highly useful application. The pure acid should be diluted with 10 volums of water. In lead poisoning

as seen sometimes in painters, sulphur baths are regarded as highly useful to eliminate the lead.

Although Sulphur has very few drawbacks when it is taken, it is best administered alone.

OPIUM.

Opium is the inspissated juice obtained from the poppy, or papaver somniferum, grown in Asia Minor. The natives tap the unripe capsules, or incise them. They are generally tapped just before sundown. The juice that exudes becomes inspissated by evaporation, and is scraped off of the shrubs and made into lumps.

The characteristics of these irregular lumps is that they weigh from two or three ounces to two pounds enveloped in the remains of poppy leaves. When broken or torn they tear in an irregular way. They are of a chestnut brown color. The surface is shiny when rubbed, having a peculiar odor and a bitter taste. Pure Opium should yield about ten per cent. of morphine. Powdered Opium is dried at a temperature of about 185 degrees fahrenheit, and reduced to a fine powder. Opium is a very complex substance. It has a number of vegetable principles in it, with 17 or 18 alkaloids. Morphine is the most important of the alkaloids. The salts of morphine are hydroclorate of morphine; acetate of morphine, and sulphate of morphine. The last named is the one in most general use.

The dose of powdered Opium is from one to two grains. Opium is a poison. Five grains is considered a fatal dose for an adult.

Opium and all the alkaloids act chiefly on the nervous system. When Opium is taken in small

doses one fourth to one grain. At first there is a stage of excitement of the circulation. The pulse are a little fuller and quicker. The skin is usually warm and flushed. During this stage the individual has a power of directing his attention to any particular object, and the action of the drug causes him to do well whatever he wishes to do. Should he wish to sleep, and circumstances are favorable, usually a quiet sleep comes on. Usually after a few hours the effects pass off leaving him with a slight headache and languor, with dryness of the mouth and slight nausea. If on the other hand he wishes to work he can do this with increased energy. If he desires to exert the mind, his imagination is more vivid, and his power of expression is greater.

With moderate doses, one or two grains, the stage of excitement is short, and the sleep for the most part is deep; yet the patient can still be aroused The after effects are severe headache with nausea, furred tongue and loss of appetite. During this state of sleep the brain is anemic. It is said that the veins and arteries are nearly empty in brain during the sleep produced by opium. When the doses are large; say three grains or more; the first stage is very short, and sleep rapidly follows and becomes deeper and deeper, and if the person be not used to opium, coma develops from which the patient can no longer be aroused. The face is generally pale with a bluish tinge, as a rule; the eyes are sunken, the pupils are very much contracted; almost to the size of a pin's point. The breathing is slow and of a snoring character; the pulse is now slow and full. If coma proceeds it

becomes feebler, and finally death occurs, the respiration ceasing before the heart ceases to beat. Before death the patient may have convulsions, but this is not common.

In children the poisonous effects of opium are more readily produced than in adults. Children under one year of age often bear it exceedingly bad. One minim has produced fatal results.

Again in old age, smaller doses should be given, as old people bear the drug badly. Women are more readily affected than men. Some persons are more easily affected by it than others. In some persons, instead of being put to sleep by it, it produces excitement and hinders them from sleeping altogether.

The effects of habit in the use of this drug is quite strange. After persons have used it for a great while they can take what would be a fatal dose to an ordinary adult, without being much affected by it; not even put to sleep by it.

Persons have usen a dozen grains a day of morphine, hypodermically without producing a fatal effect. This quantity would kill several that had never used the drug.

The first effect of opium is to stimulate, and afterwards to depress. Persons that become opium eaters, when the after effects come on, they want another dose of the drug, and in this way the habit becomes firmly established. After persons have used opium for a long time, or any of its alkaloids, so the habit is confirmed, the mental powers becomes enfeebled; the moral faculties perverted, and it is said that they are unable to distinguish between truth and falsehood. It also effects the

motor system; the gait becomes shuffling and uncertain, and the digestion is impaired.

Some persons cannot take opiates without unpleasant effect. In a number of persons it excites vomiting, which will not yield to any remedy. This vomiting can only be checked by withholding opium altogether, or any of its preparations.

Opium has been used from very ancient times. It appears from the literature on the subject that it was in use long before the beginning of the Christian era. It appears to have been a popular drug all down through the ages, and at the present day is used extensively. Truly enough, it relieves pain and produces sleep, but upon the whole I do not look upon it as a very valuable drug. There are many other ways to relieve pain, and opium and its preparations have many unpleasant effects. Occasionally a dose of opium can be given without harm, but as a routine measure, it is doubtful if it is ever indicated.

Morphine, Laudanum, Paregoric, and Apomorphine and Codeine, are all obtained from opium, and partake more or less of the characters and effects of that drug. Morphine is used very extensively in form of a sulphate. The dose is from one sixth to one third of a grain. It is used hypodermically a great deal. People often learn to use it themselves and make regular use of it in this way.

As the public use this drug extensively in some form or other I might say that it should not be used by the public at all. It is more than likely that it has caused more deaths than any other drug we possess. Its professional use is not always

judicious, and many persons are more easily affected by it than others, and persons suffering from severe diseases bear the effects of it badly. In short—it produces some of the symptoms that is peculiar to many severe diseases. One very noted one is locking up of the secretions.

When one has the headache, better than to take a dose of morphine he would do much better to take something to clear his stomach; or if his little baby has the belly-ache he would better take a fountain syringe and some warm water and wash out the child's bowels than to give it an opiate. If he cannot sleep at night he would often be more benefited to take a hot bath before he goes to bed than a dose of opium.

When one gets in a habit of using opium to produce sleep he has to increase the dose or it will produce no effect as a rule; and should he use the drug a great while he will frequently get so that he cannot sleep without it, inasmuch, it disturbs his digestion and locks up his secretions, and he is constantly having to resort to purgatives, and often it will disturb his appetite, and he will have to resort to bitters to improve his appetite, and when he quits the opium he is generally in a worse condition than he was when he began it.

In speaking of opium of course all the other preparations that is derived from it is included with it.

I failed to mention the doses of Laudanum and Paregoric. The authorized dose of Laudanum is from ten to twenty drops, of Paregoric one to two drachms. A drachm of pure laudanum is regarded as a fatal dose, but pure laudanum is very much

stronger than it is generally found put up in little bottles. I am unable to go into any details as to the evil effects of opiates more than what has already been stated, but enough has been said to imply that the public should never use any opium in any of its forms.

Nearly all the soothing syrups and cordials prepared for children, contain opium in some form; and as they often prove harmful the people should not use them in any form whatever.

NUX VOMICA.

Nux Vomica is obtained from the seed of strychnos nux vomica, a shrub of East India. The seeds are nearly circular in form; about an inch in diameter; umbilicated and slightly convex on one side; of an ash grey color; thickly covered with short satiny hairs; translucent internally; tough and horny, and exceedingly bitter, and without oder.

Nux Vomica has two alkaloids, strychnine and brucine. The brucine is not much used in medicine, and is not important to be described in this place. The seeds of Nux Vomica are sometimes powdered and used as a drug. The authorized dose is two-fifths of a grain.

The beans of St. Ignatius also contains strychnine. The activity of the Nux Vomica seeds depends entirely upon the strychnine and brucine they contain. Strychnine occurs in square octahedrons or prisms. They are rather small in size, and are colorless crystals, and have no smell. Strychnine is sparingly soluble in water, although it communicates its intensely bitter taste. It dissolves readily in boiling alcohol and in chloroform, but is not soluble in ether.

Strychnine is generally used in the form of a salt, which is sulphate of strychnine. The authorized dose is from one-sixtieth to one-twentieth of a grain.

Taken in small doses strychnine improves the appetite and increases the activity of the intestines and therefore lessens the tendency to constipation. When taken in small doses for a long time the drug produces increased sensibility of the sensory nerves so that impressions are felt more acutely. The sense of the touch is said to be rendered more acute; the field of vision is increased, and distant objects are seen more distinctly. The sense of hearing is also sharpened. Taken in larger doses it increases sensibility more decidedly, and it also increases sexual desire. If the drug still be pushed further it produces anxiety, restlessness, twitchings of the muscles, stiffness of the neck, and convulsions. These symptoms may be produced, varying in different individuals, from about one-sixteenth of a grain to one-fifth of a grain.

When a dose of a half a grain of strychnine has been taken, symptoms of true poisoning set in, in a period varying from five minutes to five hours. They are ushered in without vomiting or any other warning. The first symptom is general convulsions; the teeth are clenched; the pupils are dilated, the patient often resting on his head and heels with the hands clenched and the arms drawn tightly toward the body. The spasm only lasts about a minute and is followed by a period of relaxation. The slightest stimulus, as a draught of cold air, is sufficient to bring on another attack.

Death results either from asphyxia, which occurs

during spasms, or from paralysis and collapse, which comes on during the period of relaxation.

The treatment of strychnine poisoning consists in evacuating the stomach before the convulsions begin; but if this cannot be done, chloroform or ether should be given, and the stomach washed out while the patient is under the influence of the anesthetic.

SOME OF THE USES OF STRYCHNINE.

Strychnine is a good tonic in dyspepsia by stimulating the nervous system; it strengthens digestion and assimilation; it also increases the movements of the stomach, and gives tone to the vessels of that organ. As a tonic it is very useful during convalescence from acute diseases. In dyspepsia due to indigestible articles of diet or to alcoholic stimulants, it is useful. It is also useful in sick headache by strengthening digestion.

It strengthens the action of the heart, and in very weak hearts many practitioners prefer it to alcoholic beverages. It is regarded as useful as a respiratory stimulant; it causes the patient to breathe deeper, and is probably useful in failure of respiration.

In depression due to mental overwork it is regarded as a valuable remedy, as it increases the mental powers; but strychnine is a drug that should not be given for a very long period at a time. It is said that it has a tendency to accumulate in the system.

It was once thought to be useful in paralysis, but in paralysis from any organic disease it is most likely worthless.

It is serviceable in sexual debility. Its action in this direction sometimes proves an inconvenience in its administration for other effects; but as it is a powerful poison, and the people at large are not well acquainted with its effects, it should never be used by the public except as prescribed by a physician.

GENTIANAE RADIX,

(Or Gention Root.)

This root is obtained from the mountainous districts of Central and South Europe. The root is from a half to one inch in thickness, and several inches long; often twisted and much wrinkled or marked with close transverse rings. Its color is brown externally, and yellow within. The taste is at first sweet and afterwards very bitter.

It is generally used in the form of a fluid extract or a compound tincture. The dose of the fluid extract is from ten drops to a half a teaspoonful, and the dose of the compound tincture is from one drachm to a half an ounce.

Gention taken before meals is a very excellent appetizer; and as it is not a dangerous drug it may be used by the public. It is also useful in dyspepsia as it tends to strengthen digestion.

JALAPA,

(Or Jalap.)

Jalap is the dried root of a shrub of Mexico The root varies from the size of a nut to that of an orange. It somewhat resembles an egg in shape. It presents in color a yellowish grey color, with dark brown circles. It is used in the form of com-

pound Jalap powder, the dose of which is from 20 to 60 grains.

Resin of Jalap from two to five grains is the dose, and fluid extract of Jalap, the dose of which is from ten drops to a half a teaspoonful.

Jalap is a very active purgative. It is useful in some forms of dropsy; especially that due to renal disease. It is useful in some forms of constipation, associated with congestion of the brain.

A very convenient way of taking of it is in the form of compound Jalap powder, as the bile dissolves it; and it appears that this is required before it will act, for it has no action when it is injected into the veins or under the skin.

Jalap is not a dangerous drug, and may be used by the public without harm.

DIGITALIS FOLIA,

(Or Digitalis leaves.)

This drug is sometimes called Foxglove, and as people sometimes make use of it without it being prescribed by a physician, I will describe it.

It is collected from the wild plants when about two thirds of the flowers are expanded. This drug contains several principles that act very differently, one from the other. The extract of Digitalis is used in doses of about one fourth of a grain. The fluid extract is used in doses from one to two drops, and the infusion of Digitalis is used in doses of about from one to two fluid drachms, and the tincture of Digitalis is used in doses from five to ten minims, and Digitalin is an active principle obtained from Digitalis, the dose of which is from one sixtieth to one thirtieth of a grain.

These are the chief preparations of the drug that is used in medicine.

By chemical analysis there are at least five principles that exist in Digitalis, which all have different actions. In large doses Digitalis causes sickness, vomiting, muscular weakness, and disturbance of vision, and embarrassed respiration and death; the heart usually failing before the respiration.

The brain is unaffected in cases of poisoning, the mind remaining clear to the last. The respiration is generally somewhat slow, and occasionally before death it may become excessively slow. The effects produced on the circulation by the active principles of Digitalis are divided into four stages: First a rise of blood pressure, generally accompanied by a slowing of the pulse; second, a continued rise of blood pressure with a quick pulse, and third, a continued high pressure with irregularity of the heart's action; fourth, a rapid fall of the blood pressure, and sudden stoppage of the heart.

By some authors the rise in blood pressure is regarded as owing to increased action of the heart, and not to the contractions of the vessels. With others however, the rise of blood pressure is regarded as owing to contraction of the vessels. Slow pulse in the first stage of Digitalis poisoning is owing to stimulation of the pneumogastic nerve partly, and partly due to increased sensibility or actual stimulation of the ends of the nerves in the heart. The irregularities in the third stage depends on the action of the heart itself.

Small doses of Digitalis have a pleasant bitter taste, but it seems to exert no good effect on the

digestive organs. Larger doses produce loss of appetite, nausea and vomiting, and sometimes diarrhea. All observers agree regarding the action of Digitalis on the kidneys when the patient is suffering from valvular heart disease.

The chief effects of Digitalis are a reduction in the rate of pulse and increase in the amount of urine when administered in therapeutic doses. The diuretic action is less when the heart is much affected. The preparation generally employed to act on the heart is the tincture, while the infusion is the best diuretic.

Some of the chief uses of Digitalis are to tone the action of the heart when its action is irregular and feeble; and in dropsy it is useful in valvular disease of the heart, but when the arteries are diseased with a hypertrophy of the heart, it is not only injurious but dangerous.

Digitalis is of use in sleeplessness, accompanied by drowsiness during the day, for these symptoms usually accompany a want of tone in the vessels.

It was once used in fevers and in pneumonia it was thought to be a very useful drug, but it is now discarded as being of little or no use.

The administration should always be stopped when Digitalis produces sickness at the stomach or fainty feelings, or disturbance of vision. A person in taking Digitalis, without the dose be very small, should remain in bed.

It will be seen from what has been said that Digitalis should never be used by the public only when prescribed by a physician.

ALCOHOL.

Alcohol used as a medicine—that is in medicinal doses, when taken into the stomach it causes increased vascularity and increased secretion accompanied by a feeling of warmth; and it generally excites an appetite, for which purpose it is taken by some persons before meals. In cases of diarrhea it has a somewhat astringent action. There is considerable disagreement respecting the nature of alcohol. Some regard it as a food and others not. The chief argument in favor of its not being a food is that it is eliminated in the urine unchanged; but this seems only to occur when it is given in considerable quantities. In small doses it is partly eliminated by the breath; but undoubtedly part of it undergoes combustion in the body. In this respect it agrees with some other foods; such for instance as sugar. The argument in favor of alcohol being a food is that it is retained in the body and supplies the place of other foods so that the quantity of food which would be insufficient, with its aid becomes sufficient.

After the absorbtion of alcohol into the circulation it dilates the vessels of the surface of the body and increases the rapidity of the pulse. From the freer circulation which thus takes place in the capilaries of the surface, the skin of the face and hands become more flushed. The blood flows so freely from the arteries into the veins that there is no longer time for it to become completely venous in its passage. In consequence of the capilaries being dilated the skin is no longer mottled, but of a uniformly pink color. The veins are distended·

they fill more rapidly when emptied, and are of a lighter blue than usual owing to the blood they contain being more arterial.

The action of alcohol upon the temperature of the body is to lower it; still the person feels warmer after taking alcohol, and it is a noted fact that men under the influence of alcohol will freeze to death much more quickly than men that are not under its influence.

The dangerous effects of alcohol in very cold countries is known to those who are exposed to the extreme cold weather. The arctic voyagers generally avoid its use altogether. Its action upon the nervous tissues seems to be one of paralysis, affecting them in the inverse order of their development, the highest centers being affected first and the lowest last. Thus the power of judgment usually goes first; while the imagination may be lively and the emotions even more than usually active.

As a stimulant alcohol is servicable in shock, and in diseases running a very limited course, and to relieve pain, and in debilitated conditions of the system. It is sometimes useful in the loss of appetite and indigestion. In these instances it should be given just before meals; but in continued fevers, as typhoid, while in some cases it may be necessary at some stage of the disease, as a routine remedy it is likely it is never indicated. The tendency of most enlightened physicians is to use less and less alcohol in the treatment of disease.

The term alcohol here is intended to embrace all the preparations that are drunk that have any per cent. of alcohol in them. Whiskey and brandy

usually have from 40 to 50 per cent. alcohol, and the dose varies from a tablespoonful to one ounce.

Champagne has about fifteen per cent. alcohol; wine has from five to ten per cent. usually, and beer from two to five per cent. alcohol.

While the alcoholic preparations are admitted as very good medicines they should never be used in any other way only as a drug.

ALOES.

There are several species of Aloes. The socotrine Alloes are the best.

Character of Aloes—It is found in hard, redish brown, or yellowish brown masses. It has a bitter taste, and when breathed on has a saffron like odor. It dissolves entirely in proof spirits.

The chief preparations of Aloes in use are the tincture of Aloes and the Wine of Aloes, and the Lump Aloes, and the active principle of Aloes which is Aloin. The dose of the tincture is from ten to thirty drops; and the dose of the wine of Aloes from ten to twenty drops. The dose of the lump Aloes is from one to six grains, and the dose of the active principle, Aloin, is from one-half to two grains.

The Effects of Aloes.—Aloes in small doses has a tonic action like simple bitters. It increases peristalsis of the intestines, and also intestinal secretion. Its action is particularly exerted on the large intestines. This is shown by the great length of time from its administration until its action. It increases the secretion of bile by stimulating the liver. It only acts when mixed with

bile and in consequence is useless in Jaundice where the bile does not enter the intestines.

Aloes has little or no purgative action when injected into the bowels, but is active if mixed with Ox bile. In acute and chronic poisoning by Aloes it exerts considerable influence on the urinary tubules. It also produces albuminuria. Aloes differs from other purgatives in not causing constipation after its use; but on the contrary it renders the intestine more sensitive so that the dose can gradually be reduced. As it does not cause constipation it makes it a very desirable purgative. As it acts very slowly in most persons it is not suitable for cases requiring immediate action. It is a drug if used in small doses. It can be used for years without harm, and upon the whole it is one of the best vegetable purgatives there is. It is put up in pills and can be taken in that way, or the powdered aloes or lump aloes may be wrapped in any confection and taken.

It is highly useful in stimulating the activity of the liver, and as it is not a dangerous drug in moderate doses, it is a very suitable purgative for the public to make use of.

OLEUM RICINI,

(Or Castor Oil.)

The action of Castor Oil is that of a purgative and the dose for an adult is from a tablespoonful to an ounce; for children, one and two years old, a teaspoonful might be regarded as a dose, to be repeated every three or four hours until it takes effect.

It is a very useful purgative in children, pregnant women, and persons who have piles, and delicate people generally.

One of its chief objections is its disagreeable taste, but it can be flavored with a few drops of the mints; either peppermint or spheremint. Of late years it is highly prized in dysentry, and there are some forms of neuralgia can be cured by it if it be taken for several days in succession.

In lead colics it acts as a preventive to constipation, and is also used as a curative agent. As it is not a dangerous drug it is a very suitable drug for the people to use.

ROCHELLE SALT.

This occurs in colorless, transparent prisms, of exceedingly small size, and is generally eight sided. Its authorized dose as a purgative is from one-fourth to one-half ounce.

It is one of the most useful mild purgatives we have. It is also a good diuretic. It may be used in congestion of the kidneys, in Brights Disease, and is also very useful in little children as a purgative when no other purgative will be retained on the stomach. In very large doses it is useful in dropsy; whether of renal origin or valvular disease of the heart; and as it is not a dangerous drug it may be used by the public.

SODII SULPHAS,

(Or Sodium Sulphate.)

The dose is from one-half to one ounce. Sulphate of Sodium, when introduced into the stomach, excites peristaltic movement in it, and also has a

similar action of the bowels. It produces in the intestines a secretion of watery fluid and acts as a purgative. It is used either alone or mixed with bicarbonate of Sodium, in ulcer of the stomach, chronic gastritis, and dilatation of the stomach.

A good time to administer it is on rising early in the morning. A third of a teaspoonful taken largely diluted with water will frequently act on the bowels; but with a smaller quantity of water it usually will not act. Taken in this way early of a morning, it is often useful in chronic constipation and sluggishness of the bowels. As it is not a dangerous drug it may be used by the public.

MAGNESII SULPHAS,

(Or Sulphate of Magnesium; Commonly Called Epsom Salts.)

It occurs in minute, colorless, transparent crystals that look very nearly like sulphate of zinc. Its taste is bitter. This distinguishes it from sulphate of zinc, which has a strong metallic taste. It readily dissolves in water. As a purgative the dose is from an ounce to an ounce and one-half; and in cases of dropsy this dose may be repeated every hour until six or eight ounces are taken; beginning early in the morning and used until noon, an ounce every hour on a fasting stomach. This will often eliminate large quantities of water from the system and give considerable relief in dropsy. Whether the dropsy be owing to the heart or the kidneys or the liver or general anemia.

The best way to use it in dropsy is to take some active purgative that will produce a cleansing effect the night prior to its use. It also acts upon

the kidneys, and is useful when there is a scanty flow of urine. As it is not a dangerous drug it may be used by the public.

PODOPHILLUM,

(Or May Apple.)

This grows in a bundance in some parts of the United States. It occurs in pieces of variable lengths, about one-fifth of an inch thick, of a dark redish brown color, and breaks with a short fracture

The powdered drug and the tincture are most commonly used. Of the powder the dose is from one to three grains and the tincture from fifteen to thirty drops. It is used in cases of biliousness associated with dark discharges. It is useful in congestion of the liver and of the portal circulation in ague with congested liver, and in sick headache and biliousness. Its action is rather uncertain and it often causes griping. When incautiously handled it may get into the eyes and produce conjunctivitis. In small doses it is not a dangerous drug, and therefore may be used by the public.

OLEUM MORRHUAE,

(Or Cod Liver Oil.)

It is of a pale yellow color with a slight fishy odor and a fishy taste. It is used in doses of from a teaspoonful to one ounce. It might be regarded rather as a food than as a medicine, 'though it has traces of iodine in it, but not in sufficient quantity to be of any use. It has been largely used in Scrofula and in Tuberculosis, and Anemia, and in other diseases. It is very readily assimilated and makes a very good food, but is of little use as a medicine.

CHAPTER XII.

NATURE AND ART IN THE CURE OF DISEASE.

From very remote antiquity the power of nature in healing disease has been known to those versed in the nature of disease. Some of the most marked examples of the marvelous powers of nature to affect a cure are seen in acute pneumonia and typhoid fever; also in all the eruptive fevers. The intrinsic tendency is to get well without the use of any medicine under good nursing. It is certain that in those diseases medicines will not abort nor cut them short.

In cases of disease of this nature all that medicine can effect is to assist nature in eliminating the poisons which produce death, and alleviating severe symptoms; and in many other diseases the tendency is to get well. Even in tuberculosis where the treatment has been indifferent there are often scar formations, and where the deposits is in tuberculous lungs, nature often throws a wall around them and hems the organisms in.

When the surgeon makes an incision into the cavity of the abdomen after he closes the wound in a few weeks he can open along the same line and find the tissues completely healed and the blood vessels rejoined again. This is evidently done by nature. In fact, when the cause of disease is removed the tendency of nature is always to heal; and since we have been enlightened in the

nature of infectious diseases, the power of nature to heal are very much more apparent than ever. In many of the infectious diseases the organisms that cause the disease have a life history in the system; and in a period of nearly a definite duration they die out; and if nature can be assisted until this takes place, recovery is almost certain. This however, does not set aside the value of a number of important drugs. Often in the process of disease the secretions are locked up; and one of the most important duties of the physician is to keep the secretions up and promote elimination; for a patient will live a great while suffering from a disease, if the poisons are not allowed to accumulate in sufficient quantity to be a lethal dose.

To make what has been said more forcible I will quote a passage from Austin Flint's Practice of Medicine. Dr. Austin Flint was one among the most scholarly and conservative physicians the United States ever produced, and did great honor to American Medicine. In his practice he says: "The history of medicine shows many and great mutations in the prevailing doctrines of Therapeutics at different periods. The medical practice of the present day in many respects, is in striking contrast to that current a half century ago; and it is by no means improbable that a comparison with the present day at the end of the next half century will reveal points of contrast not less striking. These mutations, so far from being a reproach, illustrate the progressive character of medicine. Therapeutical principles can never become unchangably fixed until the utmost limits of obtainable pathological knowledge are reached, and nothing

further remains to be ascertained by experience. It would be absurd to claim for medicine this perfectability; but continued improvement in the management of disease may be reasonably expected. The future improvement will doubtless embrace the addition of new remedies and measures of treatment. More extended and precise knowledge of those already in use, and the correction of errors, which probably now, as heretofore, renders sometimes, the efforts of the physician not only inadequate but prejudicial. The uniformity of the laws of disease at different periods and places, has been already referred to. The bearing of this on the stability of therapeutics is obvious. So also with reference to the same application, it is important to assume that the system of man is not liable to alterations, which render the operation of therapeutical agencies widely different at periods not far removed from each other. The opinion held by some that such alterations have occurred within the memory of those now living does not rest on any solid basis. Admitting to the fullest extent diversities attributable to race, climate, occupation, and hereditary influences, these do not invalidate the statement that the human constitution remains essentially unchanged, as regards the application of established therapeutical principles. Were the truth otherwise it would strike at the root of medical experience. If changes requiring a revolution in therapeutics were liable to occur with each successive generation, it is evident there could be no permanent principles of medical practice. The fruits of experience in our day, which so many are striving to develop, would be not only

useless but an injury to those who are to come after us. The medical student and practitioner should have a just appreciation of the relative agency of nature and art in the recovery from disease. It is customary and convenient to personify disease; speaking of it as an enemy; to be recognized attack and if possible vanquished.

Remedies and therapeutical methods are said to be curative, as if disease were overcome exclusively by them. The mind should not be deceived by these figurative expressions. In reality recovery from disease, is always effected by nature. That is—by the agency of processes inherent in organism. All that art can do is to remove obstacles to the operation of natural processes, and to promote their favorable operation. Take as an example, a remedy which is considered especially curative—namely Quinia in periodical fever. This remedy, strictly speaking, does not cure the disease, using the term cure in its conventional sense, but it removes something on which the continuance of the disease depends. This something removed, nature effects the cure.

As another example, opium does not cure Peritinitis, but by promoting rest of the inflamed part, and tolerance of the disease, it affords an aid to nature in effecting the cure. In like manner all remedies and therapeutical measures exert their so-called curative effect in one or the other of these two ways. The expression Vis Medicatrix Natura, which has been used from time immemorial represents the agency of nature in the cure of disease. That the physician is the servant, not the master of nature; and that using the term cure in its literal

sense he has the care of diseases but nature effects the recovery have long been recognized true as these old Aphorisms prove.

Let it not be considered that to attribute supreme agency to nature is to disparage art, the triumphs of the latter are made none the less beneficent and brilliant by subordination to the former.

The achievements of the human mind in every direction are dependent upon circumstances and laws determined by a higher power."

It will be seen from the above quotation that our great leaders give credit to nature for a great deal in the restoration of patients from disease.

I might further say that nature is very sensitive to powerful drugs that are not indicated; and that it is often even the duty of the physician to withhold drugs altogether until there is a positive indication for them. A physician may be too judicious, but he is oftener given to rashness than to judiciousness. Other things being equal that is given an enlightened physician I would always prefer the judicious one. In severe diseases it is sometimes easy enough to find positive indications for medicines, but on the contrary it is often a very difficult matter; and in the language of another the physician should even be content with doing nothing when unable to do good. The duty of the physician is to closely observe nature, and whenever she needs assistance, to find out what is required and to assist her,

CHAPTER XIII.

THE HEART AND THE CIRCULATION.

The heart is the great seat of the circulation, that pumps the blood to every part of the body. It is located in the left side of the chest; its base points towards the right shoulder, and its apex toward the fifth inter-space of the ribs, a little to the right of the left nipple.

The size of the Heart approximates that of one's fist; it has four cavities, which all combined hold about six fluid ounces; there are two receiving chambers, and two chambers, which might be called delivering chambers. The receiving chambers, are called the Auricles, and the delivering chambers are called the Ventricles. The Auricles are about equal in capacity to the Ventricles; They are thin walled and collapse readily on being emptied. The Ventricles are thick walled, and do not fully collapse on being emptied. After birth the right and left sides of the heart do not communicate, except through the circulation of the blood through the tissues by means of the capilaries. Before birth there is a hole in the partition between the Auricles, called the Foramen Ovale, which admits of the blood passing from one side of the heart to the other directly. At birth this Foramen closes up, and the circulation begins for the adult. Each of the cavities are guarded by valves, so

that when the blood is delivered from one cavity to another, it is not liable to pass backward. The valves between the Auricles and the Ventricles are made up of large cusps; three on the right side and two on the left, and are held in position by tendonous cords attached to the inner-side of the cavities of the heart; these cords hold the valves so that when the cavities are filled, they completely approximate, so that in the healthy Heart, when the blood is delivered from the Auricles to the Ventricles, there is no regurgitation. The valves of the Heart open and close with great accuracy, and are constantly in motion as long as the Heart beats. The two great Arteries, that serve as tubes, that carry the blood to every part of the body, are also provided with valves that guard the blood from returning into the Heart after it has once been pumped out. The Heart acts as a double force pump; the right Ventricle pumps the blood to the lungs by way of the pulmonary artery and the left Ventricle pumps the blood to every part of the system by way of the Aorta. Some anatomists speak of the circulation as being double; that is, the pulmonic circulation and the systemic circulation, but in reality the blood makes but one circuit, but in doing this the blood has to visit the heart twice. In order first to accommodate itself to the air, in the capilaries of the lungs, and to deliver the oxygen, and nourishment to the various parts of the body. I will here give the circulation in as brief a way as possible.

Beginning in the right auricle, the blood is pumped down into the right Ventricle, the tri-Cuspid valves closing after it, the blood is now pumped out of

the right Ventricle by way of the pulmonary artery into the lungs and the Semilunar valves placed at the Crifice of the pulmonary Artery close after it; now when the blood reaches the lungs, the air-cells are placed in such close relation with the capilaries, that carry the blood, that the Carbon Dioxide and other waste products are given over to the air in the lungs, and the oxygen of the air immediately taken in; the blood is here changed in color from a maroon to a scarlet hue. The blood is now taken up by the minute radicals of the veins, and transferred to the left Auricle by means of three veins, called the Pulmonary Veins; the blood is now transferred from the left Auricle to the left Ventricle and the mitral valves close after it; the left Auricle now contracts, and drives the blood out through the Aorta to every part of the system; the Oxygen and the nourishments, which the blood may carry are now delivered up to the cells of the tissues, and the Carbon Dioxide and other waste products are delivered over to the blood, the blood now finds it's way from the systemic Capilaries into the minute radicles of the veins, which all converge below to form the vena-cava Inferior and all above to form the vena-cava Superior, which deliver the blood to the right Auricle, the point where I started from.

The Systole of the Heart is the contraction of the Auricles and the contraction of the Ventricles, it occurs exactly simultaneously in the two Auricles, and in the two Ventricles, and is immediately followed by a relaxation or a pause; this is called Diastole of the Heart or in other words the Heart, while it seems when viewed in action to be constantly

moving; it has a rest or pause between the beats. While the Auricles are contracting the Ventricles are relaxed, and when the Ventricles are contracting, the Auricles are relaxed; the entire cycle of the Heart beat only occupies something less than a second of time in a healthy man. In little children, and persons suffering from disease the cycle is greatly accelerated. A careful inspection of the beating Heart shows that during its cycle of action certain changes take place in the shape and even in the position of its cavities; this is chiefly owing to the change of the amount of the blood in the cavities, and partly to the form assumed by the muscular wall when contracting. During the interval, or pause of the Heart, the Auricles are seen to swell gradually, on account of the blood flowing into them from the Veins.

When the Auricles are nearly full, a contraction commencing in the great veins approximately where they empty into the Heart, takes place and passes with increasing force over the Auricles and gives rise to their Systolic contraction. The Auricles suddenly diminish in size, and appear to become pale. When the blood is being propelled through the Auriculo-Ventricular openings, the walls of the Ventricles appear to be drawn over the liquid mass by the contraction of the muscular walls of the Auricles, just as a stocking is drawn over the foot by the hands.

The base of the Ventricles is in this way drawn upward; the moment the Ventricles receive their full charge of blood from the Auricles, they contract, becoming shorter by the movement of the base toward the apex and thicker by the elongated cone

becoming rounder. The Great Arteries are at the same time distended with the blood from the Ventricles and elongated, their elastic walls being drawn down over the liquid mass. The soft elastic tissues are thus in turn made to slide, as it were over the fluid, that forms the fulcrum, which the muscular walls use as a purchase.

During the Systole of the Heart, the Ventricles rotate slightly on their long Axis, so that the left Ventricle comes a little forward, and the lower end of the Heart forward and to the right. When the Systole of the Ventricles ceases, they become slightly flattened, and the gradual refilling of the cavities begin, as there is nothing to prevent the blood flowing from the veins through the Auricles into the Ventricles, where the pressure is negative.

The Semi-luner valves, which as before stated are placed at the beginning of the two great Arteries, that spring from the base of each Ventricle are now closed; the large arteries grasp firmly the blood, and by their steady resilient pressure force it on toward the distal vessels. During this pause the Arteries become in a slight degree shorter and draw the base of the Heart up again by lengthening the Ventricles. The part of the Heart, which changes its position the most is the line between the Auricles and the Ventricles, while the apex remains in one position, only making a very slight side and forward motion.

The Heart communicates its motion to the chest wall, and the movement can be felt and seen over a small area, which is different in different persons, which is owing to the thickness or thinness of the chest wall; this impulse of the Heart, as the stroke

is commonly called can best be felt in the fifth space between the ribs a little to the right side of the left nipple. It is found to be precisely simultaneous with the systole of the Ventricles. During this period the base of the Ventricles move downward and become thicker. The Flacid Cone, which is formed by the Ventricles during their diastole is somewhat flattened against the chest wall, but during the systole it becomes rounded and bulges forward, and pushes the chest wall before it. This change in shape is the chief cause of the impulse of the Heart; if the Ventricles be gently held between the fingers during their systole a peculiar sensation is given by the change of the shape and the hardening of the Heart muscle. The mass in the Ventricles from being quite soft and compressible during the diastole suddenly acquires a peculiar hardness, owing to the tightness with which the muscle grasps the blood, and the greater firmness of the contracting tissue. This hardening of the Heart muscle gives a sensation of a sudden enlargement; no matter on what surface the finger be placed, the Heart seems to give a slight knock in that direction. When grasped between the forefinger placed below the Diaphragm and the thumb on the Antero-Superior Aspect, the impulse is equally felt on all sides. The important items in causing the impulse are the change in the shape of the Ventricles from a flattened to a rounded cone, and their simultaneous hardening, which helps the movement to be more distinctly felt through the wall of the chest. The point in which the impulse is best felt corresponds to the anterior surface of the Ventricles, which is a considerable

distance above the apex. It is therefore erroneous to call the impulse the Apex Beat, a term which has long been in use.

The impulses of the Heart is a very useful measure in measuring the strength of the systole, and therefore is of very great importance to the physician.

The action of the Heart is accompanied by two distinct sounds, which can be heard by bringing the ear in firm direct contact with the chest wall a little to the right of the left nipple or indirectly it can be heard by the Stethoscope. One sound is to be heard to quickly follow the other, and then comes a short pause; these two sounds are spoken of as the first and second sounds of the Heart. The first sound is heard at the beginning of the systole of the Ventricles. It is a low soft prolonged sound and is more prolonged than that of the second sound. It can be most distinctly heard over the fifth intercostal space a little to the right of the left nipple.

The second sound can be heard at the moment when the two sets of Semi-lunar valves are closed which is just after the Ventricles have been emptied. It is a sharp short sound, and is best heard at the second Costal Cartilege on the right side. The cause of the first sound has never been made perfectly clear; it has been thought to be produced by several factors. The principal events occurring at the same time as the first sound may be enumerated as follows:

FIRST—The Heart's impulse, SECOND—The rush of the blood into the great Arteries, THIRD—The contraction of the Heart and FOURTH—The

sudden tension of the Ventricular Chambers and the valves between the Auricles and the Ventricles.

It has already been stated that the impulse of the Heart is caused by a sudden change in shape and density, and not by a knock against the chest wall. It was once thought that a knock against the chest wall was the cause of the Heart sounds, but is has been found that the sounds are equally as clear, when the chest wall has been removed, so the beating against the wall has nothing to do in the production of the Heart sounds. The character of the sound is quite unlike, that which is produced by the passage of the blood through the openings in the great Arteries. The sound resembles very much that produced by the muscular tone which accompanies the continuous tetanic contractions of other muscles of the body. The first sound corresponds in time with the contraction of the Heart muscle.

In disease where the Heart muscle is weak, the sound becomes faint, although the valves are made tense by an intra-ventricular force sufficient to overcome the pressure in the Arteries, otherwise the circulation would cease. All the evidence we have tends to show that the first sound of the Heart is produced by the contraction of the muscle tissue of the Heart itself; in other words that it depends upon some sudden physical change occurring during the contraction of the Heart muscle. On the other hand the Auriculo-Ventricular valves are made tense at the beginning of the sound and injury or disease of these valves is said to be associated with a weak or altered first sound. This is often observed in disease of the Mitral valves,

The blood is said by some to be necessary for the production of this sound, because the closure and immediate tension of these valves have a share in causing of it.

The production of the second sound is more easily explained, occurring just after the Ventricles are emptied, it is simultaneous with the closure of the Semi-lunar valves at the Aorta and pulmonary orifices. The blood in the Aorta forcibly closes the valves as soon as the pressure in the Ventricles begins to wane. This sudden motion causes a vibration of the valves, which is rapidly checked by the continued pressure of the column of the blood.

BLOOD PRESSURE.

In regard to the blood pressure, I will here quote from Yeo's Manual of Physiology of King's College, London:

"The cause of the blood's motion is simply a difference of pressure within the various parts of the vascular system, for the Heart acts as the pump filling the tubes, represented by the large elastic Arteries, which can be more or less distended according as the out-flow is impeded or facilitated by the contraction or relaxation of the muscular Aterioles, which form the outlet or as the in-flow is increased or diminished by the greater or less activity of the Heart's action.

From the foregoing facts and what has been said of the direction of the blood current, namely: That it flows from Arteries through the Capilaries into the veins, it would appear that the pressure exceeds that in the Capilaries, and that in the Ca-

pilaries must in turn be greater than that in the veins, the blood flowing in the direction in which the pressure becomes less. The different manner in which the blood flows from a cut Artery, and a cut vein shows that a great difference exists in the pressure within the two sets of vessels. When a small Artery is cut, and the orifice directed upward, the blood spirts out two or three feet in jirks. When a vein is cut, the blood only trickles gently from the orifice. The force of the flow depending much upon the position of the part.

It is well to remember that bleeding from a vein in the leg or arm can be stopped by placing the limb in a position more elevated, than the rest of the body, so as to prevent the force of gravity from acting upon the blood.

By means of a special form of gauge, the Mercurial Manometer, the exact difference in the pressure, exerted by the blood against the vessel walls, in the different parts of the circulation can be accurately estimated, and it has been found by direct experiment, that the pressure varies just as one will be led to expect from a consideration of its Physical relationship, namely: With the direction and rate of the current, and the varying width of the bed in which it flows.

The falling pressure observed in the vessels, when passing from the left Ventricle into the right Auricle is not even. In the Arterioles, it falls suddenly, and a great difference exists between the Arterial and Venous pressure. It is on account of the permanent high pressure in the Arteries, and comparative low pressure in the Capilaries and Veins, that there is a continuous and permanent flow

through the Capilaries from Arteries to Veins. The fundamental problem, that must be clearly understood in studying the Dynamics of the circu lation is how the high pressure in the Arteries is kept up or in otherwords how the Arteries can exert so much pressure on the blood, when the Capilary out-flow is so wide and free; though coming to the left Ventricle from the pulmonary circulation, the blood may, on account of the exact co-operation of the two sides of the Heart, be regarded as pumped out of the Systematic veins thus: as far as the general consideration of physical force is concerned, the pulmonary circulation may be left out of the question. This pumping occurs some seventy times per minute, so that a great quantity of blood is removed from the veins and forced into the Arteries.

The Ventricles in filling the Arteries have to work against considerable pressure, and may be said to pump up the blood from low pressure veins into the high pressure Arteries, and the result of this work is the different pressure in the two sets of Vessels. During the contraction of the Heart, the Ventricular pressure exceeds that of the Aorta, while during the Diastole it falls to that of the Auricle, or even of the great veins. The Heart then, is the most essential agent in keeping the Arteries stretched and over-filled, and in emptying the veins.

The second important factor in enabling the Arterial blood pressure to be kept up, is the resiliency of the middle coat of the Arteries. It is only on account of the elasticity of their Arterial walls that these vessels are capable of being so over-

filled, and because of the perfect resiliency of the elastic coat that they are able to exert such powerful pressure on the blood for such an unlimited time.

If the Arteries were rigid tubes, to distend them with a fluid in itself, in-elastic would of course be out of the question.

The outflow from the Distal extremity would only take place, when the additional charge of blood is injected by the Heart. With each contraction the Ventricle overcomes Arterial pressure, and further stretches the elastic Artery. The act of injecting the blood into the Aorta only occupies about one quarter of each Heart beat. The Semilunar valves bear the pressure of the blood in the Aorta for the rest of the time. The whole force of the Ventricles is therefore used up in causing Arterial extension. During the greater part of the Hearts cycle, the Arteries are closed at their cardiac end by the Aortic valves, and open at their distal end to the Capilaries. As the result of this, the blood flows constantly out of the distended Arteries through the Capilaries into the veins, and tends to equalize the pressure in the veins and the Arteries, but why does this constant outflow allow the pressure in the Arteries to fall to the level of that in the veins? Or in other words what is the impediment offered to the escape of the blood that thus keeps the Arteries distended? If the Arteries and veins were a set of continuous wide tubes of similar construction and capacity throughout, it would be impossible for the Heart to empty the veins, overfill the Arteries and establish the great pressure difference that normally exists. There-

fore some resistance equal to the pressure must be offered to the flow of the blood from the Arteries into the veins. This resistance is made up of several items, of which one alone; namely the vital contraction of the arterioles is sufficient to keep up the Arterial pressure.

No doubt, the great increase of surface, over which the blood has to move in the Capilaries, and the pressure exercised upon them by the surrounding elastic tissues have influence in impeding the emptying of the Arteries, but the contractility of the Arterioles is the most important item as may be seen in the following consideration:

The resistance offered by the Capilaries is insignificant, when compared with the Arterial blood pressure, for the increase of friction accompanying their greater extent of surface is counter-balanced by the decrease of friction, depending upon the great total capacity of the Capilaries in comparison with that of the small Arteries. The Capilary resistance alone, is therefore not sufficient to restrain the blood from rushing into the veins. This is seen when the Arterioles are paralyzed, by the destruction of the nervous mechanism controlling them. The blood then flows readily through the Capilary net-work; the veins become engorged; the Arterial blood pressure falls, and the circulation comes to a stand-still. In spite of the Heart's more rapid beats, we know that beyond the Arterioles the pressure falls suddenly, and in Capilary net-work, it is always very low. The four great factors in keeping up the Arterial blood pressure may be thus enumerated: First, the Heart beat, Second, perfect Aortic valves, Third, the elastic

resiliency of the large Arteries, Fourth, the resistance offered by the contraction of the muscular Arterioles."

THE HEART'S BEAT.

If any factor in the make up of the Heart, which has been described fail to perform its office, the mechanism of the circulation is at once impaired. The Heart's beat may be stopped by stimulation of the inhibatory nerve fibers of the Vagus or Pneumogastric nerve, in which case the blood pressure rapidly falls. Weakness of the Heart beat may arise from diseases of the muscles of the Heart. as for example in Fatty Degeneration.

Any insufficiency of the Aortic valves that permits or allows the blood to flow backward into the Ventricle, allows the Arterial pressure to fall between each Ventricular Systole, which gives rise to the characteristics of a pulse with unfilled Arteries, as it is called by the clinical physician. The resiliency of the Arterial coats may also be destroyed to a certain extent by a degeneration of the tissue, in which case the large Arteries become greatly distended, and unable to exert their normal steady pressure on the blood. Injury of any of the Supre e Nervous Centers are often associated with paralysis of the muscular Arterioles and consequent fall of blood pressure, but the effect upon the blood pressure of dilatation of the small Arteries can best be seen by experimenting on the nerves, which control their contraction. If paralysis or inhibition of the vaso-motor mechanisms be experimentally produced, the result on the Arterial pressure is

the same, that is a sudden fall, which may become as low as the pressure of the atmosphere.

The chief opposition to the out-flow of blood from the Arteries, being removed they cease to be tense, even though the Ventricles continue to beat and pump the blood into them. The amount of the work done by the Heart is enormous; physiologists have made calculations as to the amount of work done by the Heart of a man under various circumstances, as it is affected by labor, occupation and the general physique of the individual, but most likely if they were produced here, they would appear incredible to the average reader, for that reason I will not produce them.

There is a difference in the size of the Heart in different individuals; people of a strong, stocky build usually have larger Hearts and consequently stronger pulse than those of a spairmake. The Hearts of men, as a rule are larger than those of women, and consequently their pulse are a little slower and stronger.

Persons with strong Hearts do not often suffer from cold hands or cold feet, and are less subject to excitement, than those with weak Hearts. Those with weak Hearts, as a rule are easily affected by cold, often suffer from cold hands and feet, and are generally more excitable than those with strong Hearts.

THE ARTERIAL PULSE.

Each contraction of the Ventricle on the left side of the Heart sends a quantity of blood into the Aorta, and communicates a stroke to the vessel. The incompressible fiuid causes the tense Arterial

wall to distend still further, but the shock to the column of blood is not transmitted on directly by the fluid, but causes the elastic walls of the Arteries to yield locally and thus is converted into a wave, which passes rapidly along those vessels. This motion in the walls of the vessel can be felt wherever the Artery can be reached by the finger, but best where the Artery is superficial, and some unyielding structure as bone lying underneath for counter pressure, as the radial Artery of the wrist and of the temporal as it passes in front of the ear. The radial at the wrist for sake of convenience is usually chosen for clinical purposes.

The motion communicated to the Arteries, that has just been described is called the pulse. It consists of a simultaneous widening and lengthening of the Artery. The Arteries near the Heart are more affected by the pulse wave, than those more remote from it, the wave becoming fainter and fainter, as it travels along the branching Arteries.

In the smallest Arteries it is hardly to be recognized under ordinary circumstances, and in the Capilaries and veins it is completely absent. The diminution in the pulse wave in the smaller Arteries chiefly depends upon the fact that the force of the wave is used up, in distending the succeeding parts of the Arteries. In the small Arteries the extent of service to which the pulse wave is communicated is great and therefore the wave is much decreased. So long as the Arterioles are contracted to their normal degree, no pulsation is communicated to the Capilaries, because the wave reaching the Arterioles is reflected by them. The pulse

wave can easily be shown to take some time to pass along the vessels.

Near the orifice of the Aorta the Arterial distension occurs practically at the same time as the Ventricular systole, but even with comparative or rough methods the radial pulse can be noticed to be a little later than Heart beat. The difference of time between the pulse between the facial Artery and the Dorsal Artery of the foot, has been estimated at one sixth of a second, and the difference of the distance of these vessels from the Heart, as the blood travels by way of the vessels, is between two and three feet, that is; a pulse wave travels more than 30 feet per second. The time that the wave takes to pass any given point must be equal to the time taken to produce it, that is to say, the time the Ventricle occupies in sending a new charge of blood into the Aorta, which is about one third of a second, knowing the rate at which the wave travels and the time it takes to pass any given point, its length may be calculated, thus the pulse wave reaches the most distant Artery in about one sixth of a second.

The average pulsations in the adult man is about 72 beats per minute; it is faster sitting and standing than it is lying. In little infants just born it ranges from 130 to 140 beats per minute. It is greatly exaggerated by many diseases, and the knowledge of it is highly useful to the physician; not only as an indication for medicines, but also the relation it bears to diagnosis and prognosis.

CHAPTER XIV.

ANIMAL HEAT.

The bodies of most animals as well as that of man are considerably warmer than the medium in which they live. Part of the energy set free by the chemical changes in the animal tissues appears as heat and is devoted to this purpose. Warm blooded animals are those which preserve an even temperature; man and a number of the lower animals have a temperature in the Heart of one hundred degrees Fahrenheit, but under the tongue or arm-pit, which is generally used for taking the temperature, the blood is found to have lost about a degree and half, so the temperature by our clinical thermometers in a healthy individual is ninety-eight and a half degrees Fahrenheit Thermometer; birds of flight have a temperature of two or three or four degrees higher than man.

Cold-blooded animals on the other hand are those in which the temperature is considerably affected by or more or less closely follows the medium in which they live.

The blood of cold-blooded animals is usually from one to ten degrees above the medium in which they live.

They produce small quantities of heat, and since they have no special plan for regulation, it does not remain in any fixed standard, as it does in the warm-blooded animals.

In every part where active oxidation takes place, heat is rapidly generated. On account of the slight variation that occurs in the temperature of man, all the changes can be measured by a thermometer, having a short scale of only about twenty degrees, each degree of which occupies a considerable length on the instrument, so that very slight variations may be easily appreciated. Such Thermometers with an arrangement for self-registering the maximum attained by the column of Mercury are in daily use by the physician for clinical purposes, for the temperature of the body is now a most important aid in the diagnosis and prognosis of a large class of diseases, as heat is constantly being lost at the surface of the body; the skin is colder than the deeper parts, and in order to avoid variations by this surface loss, the thermometer should be placed in some sheltered part of the body, as in the arm-pit, or under the tongue or in the bowel or the Vagina, still allowing a degree and a half for the loss sustained in the blood coming from the Heart to the points mentioned. The temperature of the whole body normally undergoes certain variations. Some of which are regular and periodical, depending upon the time of day, the taking of food and the age of the individual, also mental and bodily exertions, exert an influence on the temperature. The temperature is highest between four and five in the afternoon and lowest between two and four A. M.

The transition being very gradual; this diurnal variation, which in a healthy individual does not exceed more than one degree, but in a number of diseases it is greatly exaggerated. The tempera-

ture rises after a meal and falls during fasting. During starvation the temperature sinks gradually until the death of the individual.

The temperature is highest at birth, and falls something over one degree Fahrenheit Thermometer between that and the age of fifty years.

Muscular exertion, which gives the individual the sensation of great warmth, only changes the temperature of the blood from one half to one degree. Mental exertion is also said to cause a rise of temperature; very slight differences in the heat of the blood may be brought about by variations in the surrounding temperature. The abnormal high temperature of high fever is much more easily affected by changes in the rate of removal of the heat from the body, than is the normal, hence the therapeutic value of cold applications in this class of diseases. The temperature of different parts of the body also varies, and depends upon the following circumstances:

First, the amount of blood flowing through them the blood being the carrier of warmth from one part of the body to another supplying heat where it is lost and conveying material to those parts, where the heat is generated.

Second, the amount of heat produced, that is to say the activity of its tissue change.

Third, the amount of heat lost, which depends on the extent of surface, the external temperature, and the power of conduction of, and the capacity for heat of the surrounding medium; from this it is clear, that the deeper parts of the body, where active chemical changes take place, and which are protected from exposure must be warmer than

the exterior, which is constantly giving out its heat. The blood, which flows through the surface vessels is cooled, and that which flows through the interior of the body is warmed, thus the skin is usually about ninety-seven and one-half degrees Fahrenheit, while beneath the tongue it is about ninety-eight and one-half. The temperature of the blood therefore varies within narrow limits, according to the part of the body through which it has recently passed.

The mean temperature of the blood is higher than that of any of the tissues; the temperature of an organ varies with the state of its activity. During their active state, the glands receive more blood, and undergo more active change, so that they become warmer. It has already been stated, that the general affect of the tissue changes of the body is a kind of combustion in the tissues, of certain substances obtained from the food, such as Proteids, Fats and Carbo-hydrates. These combustible substances are capable of being burned in the open air or cause to unite with Oxygen, so as to produce heat, and are thus converted into Carbon-dioxide and water.

Now, in the body of man and other warm-blooded animals, this oxidation process goes on in a gradual and modified way, and the end products of the process can be recognized as Carbon-dioxide eliminated from the Lungs, and as water and Urea gotten rid of by the Kidneys.

The general tendency of the chemical changes in the tissues, is such as will set free energy in the form of heat, and a considerable part of the food-

stuffs of all warm-blooded animals are used up in generating this heat.

THE MAINTENANCE OF A UNIFORM TEMPERATURE.

In order that the vital processes of man and other warm-blooded animals shall go on in a normal manner, it is necessary that their mean temperature remain nearly the same, and we have seen under ordinary circumstances that it varies only about one degree above or below the standard. Notwithstanding the changes taking place within the temperature around us, thus we are enabled to live in any climate; either cold or hot if our body temperature remains unaltered, we suffer no immediate injury.

But there is a limit to this power of maintaining a uniform standard temperature, for instance if a man were kept for some time in a moist medium, where evaporation cannot take place, but a little higher than his body, his temperature soon begins to rise, and he dies with the signs of disturbance of breathing and convulsions.

Since the variation of more than one or two degrees, in the temperature of our bodies interferes with the vital activity of the controlling tissues in the nervous centers, it is of the utmost importance, that sufficient means for the regulation of the mean temperature of our bodies should exist.

The temperature of the body must necessarily depend on the relations existing on the amount of heat generated in the tissues, and organs and the amount allowed to escape at the surface, and these must closely correspond, in order that the heat of the body may remain uniform.

The maintenance of a uniform temperature may be accomplished:

First, by variations in the heat income, so arranged as to make up for the irregularities of expenditure, or second, variations in the loss to compensate for the differences of heat generated. Since the temperature and moisture of our surroundings are constantly varying between tolerably wide limits, the amount of heat given off by our bodies will also vary. In cold damp weather a great quantity of heat is lost in comparison with that which escapes from the body, when the air is dry or warm.

If the heat generated had to make up for the heat loss, we should expect to find a correspondingly great difference in the amount of heat generated at different times of the year.

No doubt, we have some evidence in the keener appetite or use of more fuel, and the natural tendency to active muscular exertion during cold weather shows that a greater amount of combustion takes place in winter than in summer. If the preservation of a uniform body temperature depended completely upon the variations in the amount of income keeping pace with the variation in expenditure, we would find it inconvenient to set our muscular and glandular tissues in action, except when the external temperature is such as will enable us to get rid of the increased heat following their activity.

It, no doubt appears that the general tissue combustion, as measured by the amount of Carbon-dioxide given off, increases when we are placed in colder surroundings; such for instance, as in taking

of a cold bath, but it is likely, that the variations in heat income have but a secondary influence on the body temperature. If the rate of income have any regulating influence, we have no knowledge of the manner in which such influences are exerted. On the other hand we know that the amount of heat expenditure may be varied by mechanisms, which are almost self-regulating. It has already been indicated, that the great loss of heat, generated by the body is lost by the parts in contact with the air, such as the skin and lungs. In these places the warm blood is exposed to the cool air, and loses heat by radiation, conduction and evaporation. It is clear that the greater the quantity of blood thus exposed to cooling, the greater the amount of heat would be lost in a given time. If we review the circumstances, which interfere with the uniformity of the temperature of the body, we shall see that each is accompanied by certain physiological actions, which tend to compensate for any disturbing influence.

The chief event tending to make our temperature exceed or fall short of its normal standard, may be enumerated as follows:

A casual increase in the heat income may be induced by any increased chemical activity, notably the action of the muscles and large glands. When this increased heat is communicated to it, the warm blood by the help of certain nerve centers brings about the following results:

First an acceleration of a respiratory movement increasing the amount of cold air to be warmed, and saturated with moisture by the air passages and facilitating the escape of the s· rplus caloric.

Second relaxation of the cutaneous Arterioles, thus exposing a greater quantity of blood to the cooling influence of the air.

Third a greater rapidity of the Heart heat, giving a greater quantity of blood to the air passages and to the surface vessels.

Fourth an increase in the amount of sweat secreted, affording opportunity for greater surface evaporation.

As examples of these points may be mentioned, active muscular exercise, which experience shows is always accompanied by quick breathing, the rapid Heart's action and a moist skin.

The increased production of heat in fever gives rise to the same results, with the exception of the secretion of sweat, which is an important deficiency in the heat regulating arrangements, and has much to do with the high temperature of the disease.

When a lesser quantity of heat is produced, owing to the inactivity of the heat producing tissues, the reverse takes place, that is the respiration and Heart's action are slow, the skin is pale and dry, so that little can escape.

When the temperature of the air rises much above the average, the escape of the heat is correspondingly hindered, and when the general body temperature begins to rise by this retention of caloric, we have the sequence of events given in the last paragraph, but before the blood can become warm by the influences of the increased external temperature, the warm air, by stimulating the skin, brings about certain changes, independent of the body temperature, which check the tendency to an abnormal rise. This can be shown by the

local application of external heat, which causes a rush of blood to the skin and copius sweat secretion may be induced in a part. This is brought about by impulses sent directly from the skin to the centers regulating the Vaso-motor and secretory mechanisms, and thus causing dilation and secretive activity. When the atmosphere becomes very warm, all the vessels of the skin dilate simultaneously and the escape of heat is greatly increased, while at the same time so much blood being occupied in circulating through the skin, the deeper heat-producing tissues are supplied with less blood and therefore generate a lesser quantity of heat, thus a marked rise in the external temperature, which at first sight, would seem to impede the escape of heat from the body, really facilitates it.

By causing through the Vascular and Glandular-Nervous mechanisms of the skin, a greater exposure of the blood to the cooler air, and a greater quantity of moisture to be evaporated from the warm skin.

When the temperature of the air reaches that of the body, the only way that we can dispose of the heat generated in our bodies, is by evaporation for radiation and conduction becomes impossible. In animals like man, whose cutaneous moisture is great, external heat seldom causes marked changes in the rate of breathing, but animals, whose cutaneous secretion is limited, external heat distinctly affects their respiratory movements, as may be seen by the panting of a dog on a very warm day even when the animal is at rest. Almost more important than facilitating the escape of heat, in very warm weather, are the arrangements for pre-

venting its loss, when the surroundings are unusually cold. In this case, the cold acting as a stimulus to the Vaso-constrictor nerve agencies of the skin, causes the blood to retire from the surface, and fill the deeper organs, where more heat is produced.

This bloodless skin and the underlying fat, then act as a non-conducting layer, protecting the warm blood from the cooling exposure, and at the same time the generation of sweat is controlled by a special nerve mechanism which hinders evaporation, and checks the secretion and in this way enables the body to remain at the normal standard temperature. It would then appear, that the chief factors regulating our temperature, belong to the expenditure department, and may be said to be first a variation in the quantity of the blood exposed to be cooled, and secondly to a variation in the quantity of moisture produced for evaporation. These regulaters have to compensate not only for differences of external temperature, but also for great fluctuations in the amount of heat produced in the body. The regulating power of the skin is only sufficient for the maintenance of a uniform temperature within certain limits. When these limits are passed by the rise or fall in the surrounding medium, the preservation of the uniform temperature soon becomes impossible. These limits vary in different animals, many of which have special coverings, that protect them from external influences, and retain their warmth, when the temperature is below the freezing point.

In man, the limits vary according to many circumstances, both extremes of age are more sensitive to changes of temperature. By imitating

with clothing, the natural protection with which some animals are endowed, we can aid the normal regulating factors and bear much greater extremes of temperature with safety or even comfort. It is somewhat surprising that our bodies are always at the same temperature, no matter how hot or how cold we may feel; no difference how cold the weather or how hot the weather, in otherwords no difference the season nor the climate, a man's temperature is the same everywhere and in all seasons, so long as he remains in health.

When we feel hot, the vessels of our skin are full of warm blood, and this communicates to the cutaneous nerves the sensation of general warmth. on the other hand, when the vessels of the skin are empty, the Sensory Nerves are directly affected by the cold external air. Since the full or empty state of the vessels of the skin depends generally on the heat or cold of the air, we use the expression, "It is hot or cold" and we are hot or cold, because both ideas arise from the state of the skin, but we can make ourselves warm by violent exercise on a frosty day, because we generate so much heat by muscular action, that the cutaneous vessels have to be dilated in order to get rid of the surplus, and our skin vessels being full, we feel warm. Our feelings, when we say we are warm or cold, simply depend upon our cutaneous vessels being full or empty of warm blood.

CHAPTER XV.

SENSATIONS OF THE SKIN.

The sensations arising from many impulses coming from the skin are grouped together under the sense of touch. This special sense, may be resolved into a number of specific sensations, each of which might be considered a distinct kind of feeling, but is for the most part, regarded as simply giving the different qualities to the sensation excited by the skin.

Tactile sensation, or the sensation proper, by means of which we appreciate a very gentle contact recognize the locality of stimulation, and judge of the position and form of bodies; second, the sense of pressure, and third, the temperature sense.

The variety of perceptions derived from the cutaneous surface, and the great extent of surface capable of receiving impressions, make the skin the most indispensable of the Special Sense Organs, although we value this source of our knowledge but very little. If we could not place our hands as feelers, on near objects to investigate their surfaces, we should lose an important source of information, that contributes largely to our visual judgment. We think we know by the look of a thing what we originally learned by feeling of it. If our conjunctiva did not feel we should miss its prompt warning, and our voluntary movements could not protect our eyes from many unseen in-

juries, that normally never trouble us. If the skin were senseless, it would require constant labor and effort to hold anything in our hands, and our powers of standing and walking would be seriously impaired, and how utterly cut off from the world would we be, were we incapable of feeling heat and cold.

By the sense of locality is meant our power of judging the exact position of any points of contact, which may be applied to the skin, thus if a point of a pin be gently laid on a sensitive part of the skin, we know at once when we are touched, and if a second pin be applied in the same neighborhood, we feel the two points of contact, and can judge of their relative position. When we feel anything we receive impulses from many points of contact bearing varied relationship to each other, and thus become conscious of a rough or a smooth surface The delicacy of the sense of locality differs materially in different parts of the skin. It is most accurate in those parts, which has been used as touch organs, and has developed through the course of many generations.

To explain better the sense of locality, it has been supposed that sensory circles are made up of numerous small areas, forming a fine mosaic of touch-field, each of which is supplied by one nerve fiber, and that a certain number of these little fields must intervene between the stimulating points, and an object in contact with it.

In order that the supreme centers in the brain be able to recognize the impulses as distinct, for although every touch field is supplied by a separate nerve fiber, which carries these impulses to the

brain, and is therefore quite sensitive, the arrangement of the cells in the Sensorium is such that the stimuli carried from two adjoining touch fields, are confused into one sensation, thus when an edge is placed on our skin, we do not feel a series of points, corresponding to the fields, with which it comes in contact, but the confusion of the stimuli gives rise to an uninterrupted sensation, and we have a right conception of the object touched.

There seems to be a reason for separating the perception of differences in the degree of pressure exercised by a body from the simple tactile or local impression. If we support a part of the body so that, no muscular effort be called into play, in the support of an increasing series of weights, placed upon the same area of skin, we can distinguish tolerably accurately between different weights. It has been found, that if a weight of about 30 grams, which is nearly an ounce in Apothecaries' weight, be placed on the skin, a difference of about one gram can be recognized, which equals something over 15 grains, that is we can distinguish between 29 and 30 grams, if they are applied soon after one another. If the weights employed are smaller, less difference can be appreciated; if larger weights are used, the difference must be greater, and it appears, that the weight difference always bears the same proportion to the absolute weight used.

We can perceive a difference between seven and one fourth and seven and one half and fourteen and a half and fifteen and twenty nine and thirty and fifty eight and sixty; the discriminating power decreasing in proportion as the weights are increased

in size. One of the reasons why the sense of pressure is regarded as distinct from that of locality, is that the former is found not to be most keenly developed in the parts where the impressions of locality are most acute, thus judgment of pressure can be more accurately made with the skin of the fore-arm than with the tip of the finger, which is nine times more sensitive than the former to tactile impressions; while the skin of the abdomen has an accurate sense of pressure though dull to ordinary tactile sensation, it has been said above, that the weights by which pressure sense is to be tested, should be applied rapidly one after the other. This fact depends upon the share taken in the mental judgment, by the function we call memory.

In a short time the recollection of the impression passes away, and there no longer exists any sensation, with which the new impression can be compared. At best, we can form but imperfect judgments of pressure by the skin impressions alone

When we want to judge the weight of a body, we poise it in the free hand, which is moved up and down, so as to bring the muscles, which elevate it, in repeated action. In this way we call into action a totally different evidence, this is the amount of muscle power required to raise the weight in question, and we find that we can arrive at much more accurate conclusions by this means. The peculiar recognition of how much effort is expended is commonly spoken of as muscular sense, which may arise from a knowledge of how much voluntary impulse is expended in exciting the muscles to action, but more likely it depends upon afferent impulses arriving at the Sensorium from the mus-

cles. By this means we aid the pressure sense in arriving at the accurate conclusion of the weight of bodies, so that in the free hand, we can distinguish between thirty-nine grams and forty grams.

The two chapters to follow on Temperature Sense and General Sensations, I will quote from Yeo's Manual of Physiology.

TEMPERATURE SENSE.

"We are able to judge of the difference of Temperature in bodies, which come in contact with our skin. Our sensations have no accurate standard for comparison; we are unable to form an exact conception of the absolute temperature of the substances we feel.

The sensation of heat or cold, derived from the skin itself, without its coming into contact with air of moderate temperature varies with many circumstances, and because of these radiations, the powers of judgment of high or low temperature must be imperfect. The skin feels hot, when its blood vessels are full; it feels cold, when they are comparatively empty. An object of constant temperature can thus give the impression of being hot or cold, according, as the skin, itself is full or empty of warm blood. But independent of any very material change in the blood supply of the cutaneous surface of a part, any change in the temperature of its surroundings causes the sensation of change of temperature, which is however a purely relative judgment.

Thus if the hand be placed in cold water, we have at first a sensation of cold, to which however the skin of the hand becomes accustomed, and no

longer feels cold, if now the hand be placed in water somewhat warmer, but not higher in temperature than the atmosphere, we have a feeling of warmth. If the hand be placed in as hot water as the skin can bear, it feels at first, unpleasantly hot, but this feeling soon passes away, and the sensation is comfortable. If from this hot water, it be placed again in the water of the air temperature, that which before felt warm, feels very cold.

An important item in the estimation of the temperature of an object by the sensations, derived from the skin, depends upon whether it be a good or a bad conductor of heat. Those substances, which are good conductors, and therefore when colder than the body, quickly rob the skin of its heat, are said to feel cold, while badly conducting bodies of exactly the same temperature do not feel cold; it is then the rapid loss of heat, that gives rise to the sensation of cold. The power of the skin in recognizing changes of temperature is very accurate, although the power of judging the absolute degree of temperature is very slight. By dipping the finger rapidly into water of varying temperature, it has been found that the skin can distinguish between temperatures, which differ by only half a degree Fahrenheit Thermometer. The time required for the arrival of temperature impressions at the brain is remarkably long, when compared with the rate, at which ordinary tactile impulses travel.

To judge satisfactorily of the temperature of an object, we must feel it for some time. There must be special nerve endings, which are capable of receiving heat impressions, because warmth applied to

the nerve fibers, themselves, is not capable of giving rise to the sensation of heat.

Thermic Stimuli, no doubt do effect nerve fibers, but only cause the sensation pain, when applied to them. These nerve endings are not the same as those, that receive touch impressure impressions, because the appreciation of differences of temperature is not very delicately developed in the parts where the tactile sensations are most acute; thus the cheeks and the eyelids, are especially sensitive to changes of temperature. A fact known by people, who want a ready gauge of the human body, a barber approaches the curling tongs to his cheek to measure its temperature before applying it to the hair of his client. The middle of the chest is very sensitive to heat, while it is dull in feeling tactile impressions. The hand is far from being the best gauge of temperature, for heat appreciation is not developed in due proportion to the keenness of its tactile sensibility. The larger surface exposed to the change of temperature, the more accurate the judgment at which we can arrive, the slightest changes being at once recognized, when the entire surface of the body is exposed to them.

The foregoing facts are well known to persons in the habit of testing the temperature of a warm bath, without the aid of a Thermometer. They do not use a limited surface of a sensitive tactile finger tip, but plunge the entire arm into the water. The elbow indeed is the common test used by nurses in ascertaining that the water, in which they are about to wash an infant is not too warm for that purpose. Great extremes of heat or cold, such in fact as would act as Stimuli to a nerve fiber do not

give rise to sensations of different temperatures, but simply excite feelings of pain, thus if we plunge our hands into a freezing mixture, or into extremely hot water, it's difficult to say at once whether they are hot or cold; in both cases pain being the only sensation produced.

GENERAL SENSATIONS.

We call general sensations those feelings pleasurable or otherwise, which can be excited without our being able to refer them to external objects. Compare their sensations with those of the Special Senses or even describe their exact mode of perception. Under this head are enumerated, pain, hunger, thirst, nausea, giddiness, shivering, titilation, fatigue, etc. Of these, only pain is commonly referred to any given part, and the attempt to localize pain with exactness soon shows how very different is our power in this respect, in the case of pain and in the case of tactile impressions, thus when we strike our funny-bone, the Ulner nerve passing over the Condyle of Humerus, by the tactile impressions of the skin, we know the elbow is the injured part, but the locality of the pain is not exactly to be determined, for it shoots down the arm to the little finger, and is indefinitely spread over the region to which the nerve is distributed. In studying the laws, which govern the perception of painful impressions, we must make the experiments upon ourselves; since we alone can form conclusions from the sensations produced.

The best way to carry out experiments upon pain, is to use extremes of temperature, as we can thus graduate the stimulation. The application

of a liquid over 50 degrees Centigrade Thermometer or below two degrees causes pain.

The suddenness of application to the part and its duration, and the extent of surface, as well as the previous temperature, have important influence in the amount of pain produced. The various kinds, with which we are all more or less familiar seem to be related in some way to their mode of production, but we are unable to assign any definite cause for these differences of character, thus, though such terms as shooting, stabbing, burning, throbbing, boring, racking and dragging pain are frequently used and may be of diagnostic value. We have only an indistinct knowledge that throbbing depends on excessive vascular distension of the part, that sharp pains are produced by sudden excitation of a sensitive part, and the dull pains by the more permanent stimulation of the part less well supplied with nerves; further pain, as we think of it, is a complex mental process made up of many items, such as real sencory impressions, fear, disgust, etc. When a finger is to be lanced, patients often cry out most loudly, before they are touched with the knife, and show intense feeling, when they look at the blood, flowing from the wound. Hunger and thirst are peculiar and indefinite sensations, which are experienced, when some time has elapsed since food or drink has been taken. The exact part of the nervous system, in which these impressions arise have not been determined. They are, however said to be associated with peculiar sensations in the stomach and throat respectively.

In the same way the venereal appetite, though

associated with local sensations, cannot be referred to any one part of the nervous system. Nausea is also a sensation, which cannot be attributed to any part of the nervous centers. It commonly arises in reponse to afferent impulses, such as smell, sight, taste, phyrangeal gastric or vicereal irritation, and is antagonistic to the appetites just named.

All the sensations that give rise to or precede nausea, are associated in our minds with disagreeable impressions, and no doubt, mental operations have much to do with its production.

A child free from affection may be heard to say of a Castor Oil bottle, which in itself is not ugly, "I can't bear to look at it, the very thought of it, makes me feel sick." Without any participation on the part of the mental functions, unavoidable nausea may come on from irregular movement, as that of a ship, which often cause nausea to those unaccustomed to the sea.

Certain conditions of the blood flowing through the nerve centers also causes nausea, as when emetics are injected into the blood. Giddiness, which consists of feeling of inability to keep the normal balance, is often produced in connection with the last by irregular movements, but more surely by a rotatory motion of the body. Other afferent influences may give rise to it, namely: from the stomach in some cases of irritation, from the eye, when we look from a height, from the semicircular canals of the ear, by rotation of the body, and also from conditions of the blood as in alcoholic Toxemia.

Shivering is the result of peculiar nervous affects produced by afferent influences, of an unpleasant

kind. The sudden application of cold to the skin, a revolting sight, a shrill noise or an intensely nasty taste, all excite a nervous condition, which makes us shiver.

Titillation follows light stimulation of certain parts of the cutaneous surfaces. It is a peculiar general sensation in moderation not disagreeable, and usually accompanied by a tendency to meaningless laughter and other reflex movements.

CHAPTER XVI.

THE SENSE OF TASTE.

One of the more important of the senses, is that of taste, and is peculiar to the tongue. The point, sides and posterior part of the dorsum of the tongue can appreciate tastes; also parts of the palate have the power of taste, but in a much less degree than that of the tongue, though the palate is often spoken of as the seat of the taste. It really has but a small share of this function compared with the tongue.

The power of being stimulated by various tastes is not restricted to the terminals of any one nerve, but is shared by some of those of at least three trunks, which also transmits impulses from other forms of stimulation. The Gloso-phyringeal division of the eighth pair of nerves sends branches to the posterior part of the tongue, which are no doubt connected with the special taste organs. The branch sent to the tongue of the fifth nerve, usually called the Gustatory nerve have also terminals capable of being excited by taste, and likely some fibers of the Chordo-tympani are employed in this function in the furrows around the circum-vallate Papillae and also though more sparsely on the sides of the Fungiform Papillae of the tongue are found peculiar organs called taste buds. They are flasked shaped bodies, arranged like the staves of a barrel

pinched together at the base, and at the free surface.

These bodies consist of bars, supposed to be the nerve terminals. Under the microscope the whole arrangement reminds one some what like the head of Artichoke. Nerves are seen to enter these bodies.

The relation of the Gloso-phyringeal nerves to these Tastes Buds has been shown by the fact that in the rabbit, in which animal, they are crowded together in a special organ so as to be easily found. They degenerate and in a few months disappear after one of these nerves have been cut. The genuine taste sensations are very few. Much of what we commonly call taste depends upon the smell of the substance, and we from habit confuse the impressions that arise from these two sensations. The different tastes have been divided into four, that is; sweet, sour, bitter and salty. Under some of these headings all our tastes naturally fall; although this classification has no claim to be called a chemical one, it is interesting to know, that each taste pretty closely corresponds to a distinct group of substances, that are chemically closely related, thus acids are sour, alkaloids are bitter. The soluble neutral salts of the alkalies are salty, and what are called the polyatomic alcohols, as glycerine, grape sugar, etc., are sweet to the taste. These substances likely act on the nerve terminals, as chemical stimuli, because they must be in solution before they can be appreciated. If solid particles be introduced into the mouth, they must be dissolved before the tongue can appreciate the taste.

In order to appreciate the different tastes, we

may imagine that there are different kinds of nerve terminals in the tongue, each of which is or is not influenced by the various substances possessing taste, such as sweet, sour, bitter or salty. From these different terminals nerve fibers pass bearing impulses to certain central nerve cells, each of which is capable of exciting a sweet, sour, bitter or salty sensation, as the case may be.

THE SENSE OF SMELL.

The Olfactory Nerve, which is the nerve of smell, on entering the nose, breaks up into an exceedingly delicate nervous tuft. When certain particles, to which we apply the term odors come in contact with these little terminals, they excite impulses, which when carried to the special centers of the brain, they give rise to impressions of smell. The odorous particles have to be in the form of gases or otherwise so finely divided that they may float about in the air, and the air must be kept in motion in order to excite the nerve terminals, which do not appear to produce odors unless the air is in motion, though they come in contact with the nerve terminals of the Olfactory. The extreme delicacy of appreciation of odors by the Olfactory Nerve terminals, is certainly very remarkable; even in human beings, whose sense of smell is very poorly developed, compared with some of the lower animals and amount of odorous substance can be perceived, which the finest chemical tests fail to appreciate. Some physiologists have estimated that the two-millionth part of a milligram of musk is sufficient to excite the special energy of a man's Olfactory apparatus. No satisfactory classifica-

tion of odors has been made out. The common division into agreeable and disagreeable smells or scents is dissimilar in different individuals, and therefore cannot have a physiological basis.

With smell, as with taste, no degree of intensity of stimulation can be said to produce pain, though disgust, nausea, vomiting and many other nervous operations, are sometimes induced by smells. The appetite is either excited or annulled by odors.

THE SENSE OF VISION.

One of the most beautiful ways, that we are brought in relation with the surrounding world is by that of vision; the organ of which is the eye, and it is very remarkable what a great field of vision we possess, when we only get a small beam of light, through a little aperture in the iris of the eye, ordinarily not bigger than a bird-shot, called the pupil, or sight of eye. When we look up at night, when the sky is clear and see hundred or thousands of stars, many of which are much larger than the earth, on which we live, and they are hundreds of millions of miles and even hundreds of billions of miles and yet we can see them, we cannot but come to the conclusion, that the range of our vision is very great. The eye of all vertebrate animals, including man, is enclosed in a firm case, which is called the schlerotic coat of the eye. It is seen between the eyelids, under the transparent conjunctiva, and is known as the white of the eye. It gives shape and protection to the eye, and though it is translucent, it is not transparent. In the front part of this Tunic, is a round window-like

portion, which is called the Cornea, sometimes called the transparent Cornea, and forms the anterior segment of this protecting covering of the eyeball, and is inserted into the Chlerotic coat with a beveled edge.

The Cornea is distinguished from the Schlerotic coat, not only by its glass like transparency, but also by being a part of a lesser sphere, than the Schlerotic and thus projects a little more than the rest of the globe of the eye. Closely attached to the inside surface of the Schlerotic is a thin black sheet of tissue called the Choroid coat. This, the Choroid coat carries the blood vessels, which supply the eyeball with blood. Its outer layer is traversed by Arteries and Veins of relatively large size, and its inner layers is composed a dense net-work of Capillary Vessels. As the Choroid coat comes forward, and approaches the Cornea, it is peculiarly modified and thrown into folds. These folds are called ciliary processes, forming a series of vascular folds, which radiate from the margin of the Cornea.

At the edge of the Cornea, the Choroid is firmly attached to the Schlerotic by a very delicate little muscle, called the Ciliary Muscle, and also by bands of tissue from the posterior surface of the Cornea, which holds it in position. In a modified form, which is known as the Iris, this pigmented coat of the eye leaves the Schlerotic, and hangs freely in a fluid, being easily recognized through the clear Cornea, as a colored circular curtain. It is this pigmented curtain that is the colored part of the eye, which we speak of as black, dark, hazel and blue eyes. This curtain has a central opening in it which looks black, and as before stated is called

the pupil. The pupil is merely an opening in the Iris, which allows the ray of light to pass into the interior of the eyeball, besides serving as a medium for the transmission of vessels, to the globe of the eye, the Choroid is useful in vision by preventing the reflection of light from the back ground of the eye, in such a way as would cause the irregularity of the distribution, and thus dazzle and interfere with the distinctness of vision; in other words it is said to serve the purpose of absorbing the superfluous rays of light. The Iris has a special power of motion by means of which the opening can be made smaller so as to regulate the amount of light admitted to the eye, and to cut off the rays of light, which would pass through the margin of the Dioptic media.

The importance of this will be better understood as we go further along. On the inner side of the Choroid, and immediately in contact with it, is the nervous coat of the eye, called the Retina. This is formed by the expansion of the optic nerve, which comes forward to the Schlerotic obliquely, and enters somewhat to the nasal side of the axis of the eye. This nervous coat, called the Retina lines all the back part of the eyeball, and comes forward to be fused with the ciliary processes.

The Fibrils of the Optic nerve reach the inner surface of the coats of the eye, and lie in immediate relation to the transparent medium, which is called the vitreous humor, which occupies the greater part of the globe of the eye. The ultimate nerve endings are situated in pigmented cells, which forms the outer layer of the Retina.

THE DIOPTRIC MEDIA OF THE EYEBALL.

By Dioptric media of the eyeball, is meant the transparent parts of the eye, which light has to pass through to fall on the Retina, or be focussed on the Retina in order to produce vision. The transparent Cornea, the Aqueous humor, the Chrystaline lens and its capsule and the vitreous humor constitute the Dioptric media of the eye.

The Cornea has already been described which stands in the front part of the eye, next is the Aqueous humor, which occupies from the Cornea to the Chrystaline lens, and next is the Chrystaline lens, and then the Vitreous humor, which occupies the chief part of the globe of the eye. These media act upon light, as all transparent bodies do, this action upon light is to bend the rays, and is called refraction. Light, when passing from a rare to a denser medium is refracted. The index of refraction varies in different transparent bodies, each substance has an index of refraction of its own. Light is most strongly refracted by diamond, of all perfectly transparent bodies. Now, light in passing into the eye is refracted, first by the Cornea, which converges parallel rays or divergent rays, but this refraction is by no means sufficient to focus the rays on the Retina.

The Chrystaline lens lies just at the back of the pupil, and is much harder than the Vitreous humor, but its outer layers are not much harder than jelly. It is perfectly transparent, and is nearly spherical in a child in shape, but becomes less convex with age.

Now, in a transparent body, the rays of light are bent toward the thicker part, this Chrystaline

lens is a double convex lens, or in other words, it approaches a roundness, which makes it thicker in the center than elsewhere. Now, when the rays of light strikes the Chrystaline lens, they are all refracted except the central ones, that is: they are all bent toward each other, and in the healthy eye, which is called an Immetropic eye, they focus exactly on the Retina at a point called the Macula Lutea. Now, these rays are so refracted or bent by the Chrystaline lens, that the image on the Retina is inverted, in other words before the rays of light reach the Retina, they cross each other to form an inverted image. An ordinary double convex lens, made of glass will produce the same affect, that is: so bend the rays, that they will cross each other. If we hold a bi-convex lens a certain distance from the eye, and look out of the window we can see an inverted image of a landscape. If we now place a piece of transparent paper behind the lens, we can throw a representation of the picture on it, which will be inverted, this power of convex lenses is employed in the instruments used for taking photographs, which consists of a box or chamber into which the light is allowed to pass through a convex lens so that an inverted image of the objects before it can be thrown upon a screen.

When we wish to take a photograph, we substitute a sensitive plate, which may be sensitized by several different chemicals, such as Nitrate of Silver and Iodide of Potassium; a picture is formed by the uniting of the chemical principle of the light with the chemical, that is on the plate, and the image is inverted. The double-convex lens in the camera Obscura so bends the rays, that the

image is inverted, in otherwords the rays cross each other; just in the same way an inverted image of the things we look at is formed on the Retina by the refracting media of the eye; though our organ of vision is often compared to a Camera Obscura, the refractions of light which occur in it, are far more complex than they are in the Camera.

In the Camera we have only two media, that is: the glass lens and the air. In the eye, on the other hand, we have several, which have distinct refractive influence on the rays of light, which pass through the pupil.

THE ACCOMMODATION OF THE EYE.

Respecting the accommodation of the eye, I will here quote from Yeo's Manual of Physiology the following:

"As already stated, the normal eye is to be constructed so that parallel rays of light, that is: those coming from practically infinite distance are brought to a focas on the Retina. This is why we see the stars, which are practically infinitely remote from us, as mere luminous points; it is therefore impossible to fix a far limit to our power of distant vision. The nearer an object is brought to our eyes, the more effort is required to see it distinctly, until at last a point is reached, where we cannot get a clear outline, no matter how we strain our eyes. For a normal eye, called the Immetropic eye, this near limit is about 12 centimeters, or five inches, but it varies in different individuals. For objects that are over ten meters distance, very little change in the eye is required to see each distinctly, and the nearer the object approaches the more frequently

the adjustment of the eye has to be altered to see it clearly.

When the eye is focussed for any point, within the limits of distinct vision, certain range of objects at different distances from the eye can be recognized without moving the adjustment. The range of this power is measured on the line of vision, and called focal depth. In the distance we can take in a great depth of landscape without effort or fatigue, but when looking at near objects, the focal depth is less, and we must constantly accommodate our eyes afresh in order to see clearly objects at slightly different distances, because of the shallowness of the focal depth in the near parts of visual distance.

The method by which the accommodation of the eye is effected differs from anything that can be applied to an artificial optical instrument, and is more perfect.

The following alteration are observed to occur in the eye during active accommodation, that is: when looking at near objects, first the Iris contracts so that the pupil becomes smaller, second central part of the anterior surface of the Chrystaline lens moves slightly forward, pushing before it the pupillary margin of the Iris, so that the lens becomes more convex; third, the posterior surface of the lens also become more convex, owing to the general change of shape of the lens, but the center of this surface does not change its position. Fourth both eyes converge. These movements can be seen in life by observing the changes in relative positions and etc. of the reflection of a cannel flame thrown from the Cornea and the two surfaces of

the lens. On the Cornea is seen a bright upright flame, next comes a large diffused reflection from the anterior surface of the lens, and at the other side of this, a small inverted image of the flame reflected from the posterior surface of the lens. When the adjustment is changed by looking from a far to a near object, the image on the front of the lens becomes smaller, and moves toward the center of the pupil. The image on the back of the lens also becomes smaller, but does not change its position.

The amount of movement has been accurately measured by a special instrument called an Ophthalmometer. The motions can be more exactly studied by means of the Phakoscope, a dark box, in which prisms are placed, before the observed eye, and each image is made double. The change in the relative position of the two is more readily recognized, than a mere change of size of the one. The alteration in the shape of the lens is accomplished by the action of the muscular layer already named, which radiates from the edge of the Cornea to the Ciliary region of the Choroid coat, where it is attached. When the Ciliary muscle contracts, it draws the Choroid coat and the connections of the suspensory ligament of the lens, slightly forward, The junction of the Cornea, and the Schlerotic being its fixed point. Under ordinary circumstances, the eye being at rest, the suspensory ligament is tense, and exerts a radial traction on the anterior part of the capsule of the lens, tending to stretch it flat; this affects the shape of the soft lens, and reduces its convexity. When the Ciliary muscle shortens, it draws forward the attachment

of the suspensory ligament, relaxes it and removes the tension of the capsule, so that the unconstrained elastic lens bulges into its natural form.

The posterior surface cannot extend backward, because there it is in contact with the vitreous humor, which is held more firmly against it by the increased tension of the Hyaloid membrane during the contraction of the Ciliary muscle. Some circular muscular fibers help to relax the ligament, and relieve it from the increased pressure which the contraction of the radiating fibers must indirectly cause on the Vitreous humor. The act of accommodation is a voluntary one, the nerve bearing the impulse to the Ciliary and the Iris muscles, coming from the third nerve by the Ciliary branches of the lenticular ganglion. The local application of the Alkaloid of the Belladonna Plan to atropin causes Paralysis of the Ciliary muscle, and wide dilutation of the pupil, and the Alkaloid of the Calabarbean, physostigman produces contraction of the muscles of accommodation and extreme contraction of the pupil."

THE DEFECTS OF ACCOMMODATION.

Myopia, or near-sight is a condition of the eye, in which the rays of light focus in front of the Retina, and a blurred image is formed. It has been said that the near limit of distinct vision differs in many persons from the 12 centimeters of the normal emmetropic eye. The distance is about five inches from the eye, and it is found, that the power accommodation, varies very much in different individuals, thus in near-sighted people, who have Myopic eyes, that is: eyes in which parallel rays

of light are focussed in front of the Retina, the near limit may only be half the normal, that is, two or two and one-half inches, and the far limit, which is normally indefinite, is found to be in a comparatively short distance of the eye. They, therefore cannot see distant objects clearly, since the rays are focussed before the Retina is reached, and then, diverging, cause diffusion circles, and blurred picture. The work of their condition is also much more laborious, since they can only see in that part of the range of accommodation, while the adjustment has to be altered for slight variations of distance. This defect, if not of a very high degree can be remedied more or less by the use of concave lenses, which renders the rays of light divergent before they strike the Cornea, and thus allow the rays to focus on the Retina.

Hyper-metropia is another defect in the accommodation; it is sometimes called long-sight. In the Hyper-metropic eye, parallel rays of light are brought to a focus at a point beyond the Retina, so that divergent, or parallel rays cause diffusion circles, and a blurred image. This may be remedied by means of convex lenses, which make the rays convergent before they strike the Cornea, and in this way enable them to be sooner brought to a focus by the dioptric media of the eye.

Pres-byopia is a name given to change of the perfectness of accommodation, frequently accompanying advancing years. The lens becomes less elastic and the Ciliary muscle weaker, so that the change in form required to see objects distinctly are difficult or impossible to attain. The lens being nnable to render itself sufficiently convex, the focus

for near objects is beyond the Retina; convex lenses are the remedy.

Another defect in our eyes is the condition called Astigmatism. This depends upon an irregular or imperfect curvature of the Cornea, which causes the rays to not all focus together. Some of them may be properly focussed, while the others are focussed in front of the Retina, or some of the rays may pass over the Retina.

Slight degrees of astigmatism often pass unnoticed, but the more decided forms of it require to be corrected by cylindrical lenses.

MENTAL OPERATIONS OF VISION.

Our visual sensations enables us to perceive the existence and correct form of various objects around us for visual perception, something more is necessary than the mere perfection of the dioptric media of the eye, and of the Retinal nerve mechanisms.

Besides the changes produced in the Retina, and in the nerve cells of the visual center, there must be psychical action in all other cells of the cortex of the brain. This action of the brain consists of a series of conclusions, drawn by experiences gained by our visual and other sensations. Our ideas of objects are not always in exact accord with the image produced on the Retina and transmitted to the brain, but are the result of a kind of argument carried on, unconsciously in our minds, thus when no light reaches the Retina, we say that it is dark. Our Retina being stimulated, no impulse is communicated, and the sensation of blackness arises in our sensorium. When luminous rays are reflected to the Retina, from various ob-

jects around us, the Physiological impulse starts from the eye, but in the brain by unconscious psychical activity, it is referred in our minds to the objects around us, so that mentally we project into the outer world what really occurs in the eye; so also from habit we reinvert in our minds the image, which is thrown upon the Retina up-side-down by the lens, and so unconscious are we of the psychical act, that we find it hard to believe that our eyes really receive the image of everything inverted, and our minds have to reinstate it to the upright position.

One of the most important means employed to enable us to form accurate visual perceptions is the varied motion, which the eyeballs are capable of performing.

BI-NOCULAR VISION.

When we look at an object with both eyes, we have a separate image thrown upon each Retina, and therefore two sets of impulses are sent to the sensorium, one from each eye, yet we are only conscious, or only can discern one image. It is said that the reason of this is, that experience has taught us that similar images thrown upon certain parts of the two Retinas, correspond to the same object, and in our minds, we fuse the sensations caused by the two images, so that they produce but one image.

Bi-nocular vision is useful for the following purposes:

FIRST to judge of distance; when using one eye only, some knowledge of distance may be gathered by the force employed to accommodate, but

a much more accurate judgment can be arrived at, when both eyes are used and the muscular sense of the ocular muscles, employed in converging the eyeballs for near objects, gives further evidence of their distance.

SECOND in judging of size; in the same way with one eye we can only have an idea of the apparent size of an object, which will vary with its distance. With a knowledge of apparent size and distance, such as we gain by bi-nocular vision, we can come to a fairly accurate conclusion as to the size of an object.

THIRD to be able to judge of the relative distance of objects, such as to see depth in pictures, bi-nocular vision is necessary. If one eye alone is used, we see a flat picture, without having an accurate idea of the relative distances of different objects. With each eye, however we get a slightly different view of each object, and thus we are helped to a conclusion, as to their exact distances and shapes and arrive at correct judgments as to their form.

THE SENSE OF HEARING AND SOUND.

The sense of hearing and sound, being accurately described by Yeo in his Physiology, I will here quote from him the following:

"Just as impulses, traveling along the Optic nerve, can only give rise in the sensorium to impressions of light, so in pulses passing into the sensorium via the auditory part of the Portio-mollis of the seventh pair of Cranial nerves can only excite impressions of sound, and any stimulation of that nerve gives rise to sound sensations. The Peripheral end of the special nerve of hearing is

distributed to an organ of very peculiar construction, situated in the internal ear, which from its complexity, has been called the Labyrinth.

The nerve endings are spread out between layers of fluid, so that they must be stimulated by very gentle forms of movement, and when we consider their delicacy, we cannot be surprised, that even sound vibrations suffice to stimulate these terminals, and transmit nerve impulses to the brain. The Organs of hearing of the Mammalia are so deeply placed in the petrous part of the temporal bone, that special mechanisms have to be adopted to convey the sound with sufficient intensity from the air to the fine nerve terminals. These make up a complex piece of anatomy, which will be briefly referred to presently.

Before attempting to describe the complex mechanisms, by which sound is conveyed from the air to the nerve endings, some notion must be formed of what sound is, from a merely physical stand-point. By means of the sense of hearing, we form an idea of sound, and here the knowledge of sound ends with many people, since they only think of it as something they can hear. A Physicist, however regards sound in a different way; he knows that it is produced by the vibrations of elastic bodies, such as a tense string, a metal rod or an elastic membrane. These vibrations being communicated to the air, are conveyed by it to our nerve endings where they are set up nerve impulses. The impulse is transmitted along the nerves of the brain, and there gives rise to the sensations, with which we are familiar, as sound. The vibrations of the air are wave-like movements depending

upon a series of changes of density in the gases, the particles of which move toward or from one another, and transmit the motion to their neighbors, so as to propagate the sound wave.

To demonstrate these vibrations, a special apparatus must be used. When a tuning fork is struck, it is thrown into vibrations and a sound is given forth, but the vibrations are often so rapid, and so small, that the motion of the tuning fork cannot be appreciated by the eye, but if a fine point be attached to one prong of the tuning fork, or indeed any elastic body, such as a bar of metal, and this point be brought into contact with a moving smoke surface, such has been already described for similar records, a little wavy line is drawn, showing that the vibrating fork moves up and down at an even and regular rate. Each up and down stroke indicates a vibration. The length of the wave as drawn on an evenly moving surface of the recorder, shows the amount of time occupied by each vibration. This is always found to be the same for a tuning fork of a given pitch, and thus the recording fork is in constant use by the Physiologist, as an exact measure of small intervals of time. The pitch of the note depends upon the rate or period of vibration. A tone of a certain pitch being simply a sound caused by so many vibrations per second, the quicker the vibration the higher the note, and the slower the deeper, until at the rate of about thirty per second, no sound is audible. Whether a note be produced by a metal fork, a tense string, or any other vibrating body, if a number of vibrations per second be the same, the note must have the same pitch.

The elevation of each vibration, as seen in the tracing made by a recording fork, is different at different times. When the fork is first struck, the waves are high and well marked. The excursions of the recording prong become less and less extensive. As the fork gradually ceases to vibrate, and the sound diminishes, or in other words, as the sound produced, becomes fainter, the vibrations become smaller. The amount of excursion made by the vibrating body is spoken of as the amplitude of the vibration, and upon it depends the loudness or intensity of the sound. The pitch of a tone bears no relation to the amplitude of the waves of the vibration, but depends upon their rate, while its loudness is quite independent of the period occupied by the vibrations, but is in proportion to the amplitude of the waves.

So far, only tones or musical notes have been mentioned. They are produced by vibrations occuring at perfectly regular periods. The simple and more regular the vibrations, the fewer the tones The great majority of the sounds, we are accustomed to hear, are not pure tones, but are the result of an association of vibrations bearing some relation to one another; when the variety of vibrations is very great, their intervals irregular and out of proportion, they give rise to a discorded sound, called noise. So long as such commensurability exists in the rate of the vibrations, as to produce a sound not disagreeable to the sense of hearing, it may be called a note.

By the use of a series of different Resonators, each of which is capable of magnifying a certain tone, it can be shown that the clearest and purest

notes, of our musical instruments are far from being simple tones, but are really compounds of one prominent note or fundamental tone, modified by the numerous additions of overtones or harmonies. If one blows forcibly across an orifice, leading to a space, in which a small amount of air is confined, such as the barrel of a key or the mouth of a short-necked flask or bottle, either a clear shrill or a dull booming sound is heard, which varies in pitch according to the proportions of the air containing cavity. This dull note is a simple tone. It is devoid of character, and in this respect differs greatly from the notes produced by a musical instrument.

The notes of every instrument have certain characters, or qualities, which enables even an unpracticed ear to distinguish them. This quality, which is independent of the pitch, or the intensity is called the color or timber of the note. It depends on the number, variety and relative intensity of the overtones, or harmonics, which accompany the notes, so that really the timber, or quality of a note, and therefore the special characters of the different musical instruments is produced by their impurity or the complexity of the overtones, which aid in producing them.

All elastic bodies can vibrate and therefore are capable of conducting sound. Sound vibrations may be transmitted from one body to another placed in contact with it. From a hard material the waves readily communicate with the air, and this is the ordinary medium by means of which sound is transmitted to our organs of hearing. In the old experiment of placing the small bell under

the glass of an air-pump, and making the tongue strike after the air has been removed, the fact that no sound is produced, shows that the medium fo the air is essential for the transmission of sound vibrations. The transmission of waves of sound from the air, more dense materials, such as those, which surround our Auditory nerve terminals takes place with much greater difficulty, than that from a solid to the air, and we find a variety of contrivances by which the general air waves, arriving at the ear are collected and intensified on their way to the labryinth.

The medium of the air is not necessary in order that its sound may reach the internal ear, nor is the route through the outer canal, and the drum and its membranes, is the only one by which the vibrations can arrive at the Cochlea.

The solid bone, which surrounds the Labyrinth, is in direct communication with all the bones of the head, and sound can travel along these bones and reach the nerve endings. This can easily be proved, by placing the handle of a vibrating tuning fork against forehead or better still against the incisor teeth. Sound, although previously hardly audible at once becomes quite distinct or even appears loud. This direct conduction through the bones of the head is under normal conditions of little use to man, but attempts have been made in cases where the ordinary auditory passages were rendered inefficient by disease together with the vibrations on an elastic plate and apply this to the teeth.

This direct conduction of sound is very valuable in determining the seat of disease in cases of deaf-

ness. So long as the clear sensation of sound reaches the brain, through the bones of the head, we know that the important nerve endings, and their central connections are unimpaired, and conclude that the disease lies in the mechanical conducting part of the hearing organs."

THE STIMULATION OF THE AUDITORY NERVE.

The stimulation of the nerve of hearing by sound vibrations of the air is less difficult to understand than that of the Optic nerve by light waves, which are conveyed by an imponderable medium. The motions of the membrane of the drum being conveyed in the manner already indicated to the liquids within the internal ear, pass over and under the cells connected with the nerve terminals, which are placed on the elastic vascular membrane, the basis of the inner rods being fixed at the inner margin of the vascular membrane can move but little, and the basis of the outer rods being placed near the middle of the fibers of the membrane, where the motions of the vibrations are most extensive, a slight change in their relative positions and the consequent movement of both take place.

This movement of the apex of bow, where the rods join, is communicated by the medium of the reticular membrane to the ear, and the special Auditory cells, thence to the nerves where an excitation is produced, giving rise to the transmission of an impluse to the brain. We are first enabled to determine differences of loudness, and second of pitch, and third of qualities and sounds. Since the loudness depends simply on the amplitude of the vibration, we have no difficulty in under-

standing how variations in it can be appreciated since the more ample the vibration, the more marked motion and therefore the more intense the stimulation of the nerve terminals. What we call the loudness of a sound, simply means a greater or less stimulation of the intensity of the nerve. The perception of the difference of pitch presents greater difficulty. As already mentioned, this depends upon the rate of vibration. We know that most bodies, capable of producing sound vibrations have a proper tone, that is, that which they produce when struck. When the tone proper to a body, capable of vibrating, is sounded, in its immediate neighborhood, it also is set vibrating through the medium of the air. If a clear tone be sounded loudly, over the strings of a piano a kind of sympathetic echo will be heard to come from the strings, corresponding to the notes sounded.

In the vascular membrane, we have practically a series of strings of different length. Since the membrane gets wider as it passes from below upward to the summit of the Cochlea, and therefore a great variety of proper tones. With a high note, a fiber of one part of the membrane will readily fall into vibration, and with a low note the fiber of another part. Different nerve fibers are in relation to these different parts, and we may conclude that tones of different pitch stimulate distinct nerve terminals, and are conveyed to the brain by separate nerve channels. Impulses arriving at certain brain cells give rise to the ideas of high tones, and the impression coming to others cause the impression of low tones.

There are about a sufficient number of fibers in

the vascular membrane for all the notes we can hear, that is, from about thirty-three to thirty-eight thousand waves in a second. The explanation of our wonderful appreciation of the delicate shades of quality of tone is still more difficult. Even persons with indifferently good ears, as musicians say, and no special musical education can at once distinguish between the quality of the same note, when sounded of a violin, piano and a flute.

When a note is sung against the strings of a piano, however pure its tone, a great number of strings are set vibrating. Not only does the string of the note vibrate, but also those that have a certain numerical relation to its vibrations; in fact all its overtones resound.

In the Cochlea, we suppose the same to take place with the fibers of the vascular membrane. Not only does the one fiber, whose proper tone is sounded vibrate in response, but also those that represent the varied overtones or harmonics.

It has already been indicated, that the quality of a tone depends on the relative number, force and arrangement of harmonics, which invariably accompany any musical note, that possesses a different character. When a note arises at the Auditory nerve terminals, one of these is strongly stimulated by the wave of the fundamental tone, and many others by different overtones, for every prominent overtone stimulates the Cochlea. The complexity of the impression increases with the impurity of the tone, and so we appreciate the quality of a note, thus a compound of impulses, corresponding to a mixture of tones of varying intricacy is transmitted to the brain cells, where

it gives rise to the impression of the quality which we by experience associate with that of a violin, flute or piano, as the case may be.

With regard to the judgment of the distance of sound, it may be said that it chiefly depends on former experience of the habitual quality and intensity of sound.

A faint sound with the same quality, that we familiarly attribute to a loud sound, seems to us to be far away, thus sounds, reaching our Labyrinth by the cranial bones, appear distant, and ventriloquists deceive us by imitating the character of distant sounds. The direction from which sound comes is chiefly judged by the difference of intensity, with which it is heard by one or the other ear? When we cannot form any idea of what direction a sound comes, we turn our heads one way or the other in order to present one ear more directly to the origin of the sound.

When a sound is either directly behind or before us, we cannot judge from which position it really comes, unless the head be turned slightly to one side or the other before the vibrations have ceased to be Audible.

THE MECHANISM AND USES OF RESPIRATION.

In the lower forms of animal life, breathing is not required, such animals as live in the water and in the ground, do not require but little oxygen. They absorb all their necessary oxygen from water; some of them are provided for gills for this purpose. They are always cold-blooded, and consequently combustion in them is very feeble, but in the higher organizations of animal life, combustion is carried

on in a much more energetic way, and the animals are warm-blooded, and are provided with lungs. These lungs are constructed in such a way, that the blood of the animal is brought in contact with the air so closely that it readily absorbs the oxygen, and can equally as readily dispose of the Carbon dioxide. This gas interchange takes place at birth, and is carried on continuously to the end of their lives.

Before birth the mother breathes for her child; the construction of the Placenta is such as to readily take the oxygen from the mother, otherwise the child would immediately die. As has already been stated in a previous chapter, the air consists of Oxygen and Nitrogen, and some other normal constituents, that are not necessary to the present discussion. About twenty one per cent. of the air is Oxygen in the form of a gas. This gas is absolutely essential to all forms of animal life, and in the higher animals, as man it carries on a burning process, that keeps the temperature of the blood up to one hundred degrees, Fahrenheit Thermeter. The Carbon of the tissues furnish the fuel, and the oxygen unites with the Carbon of the tissues in the same way, that it does the carbon of coal or wood in a fire, and the product is the same, which is Carbon-dioxide, but in animal life there is a regulating mechanism, that keeps the temperature very much below that of flame.

The regular income of Oxygen and the discharge of the Carbon-dioxide as the first essentials to life; here as in nutrative materials, the blood acts as a carrier, the Pulmonary half of the circulation is completely devoted to this gas interchange between

the blood and the atmosphere. The gas interchange between the blood, and the tissues takes place in the Systemic Capillaries, and is sometimes called the Tissue Respiration. In all the Mammalia, the Pulmonary Apparatus is so far perfected that all the gas interchange, that is necessary can be carried on by the lungs, and the respiratory influence of the skin or the mucus membranes may be regarded as insignificant, but it should be remembered that whenever the blood is in close relation to the Oxygen, the Oxygen is readily absorbed by the blood, and in some of the lower animals, the surface of the skin aids materially in respiration. Frogs can live by this skin respiration for almost an indefinite time.

As has already been indicated, the change in the lungs consists in the Oxygen being taken from the atmosphere by the blood, and Carbon-dioxide being given off from the blood to the air. In the Capillaries of the tissues on the other hand, the blood takes up the Carbon-dioxide, and gives over the chief part of the Oxygen that it contains. When the blood receives the Oxygen in the lungs, it changes its color from a maroon or slightly bluish color to that of a scarlet red.

The lung consists of an almost infinite number of minute air sacs, that are all the time more or less filled with air. These little air sacs are called Alveoli. The channels, that enter to and from these sacs are called the air passages, and the motor arrangements, that carry on the ventilation of the lungs are usually spoken of as the chest.

As stated in a previous chapter, the Pulmonary Artery when entering the lung, bursts up into an

innumerable number of Capillaries. Now, each one of these little sacs, that has just been spoken of is supplied with one the Capillaries. The wall between the sac and the Capillaries is so constructed that when in health, no blood whatever can escape into the sac, yet the Oxygen, which is in the form of a gas can instantly pass through the wall into the blood, and conversely, the Carbon-dioxide, and other waste products can escape into the air of these little sacs with facility.

The lungs are completely invested by a fine delicate membrane belonging to the serous variety, and on either side is reflected off on the wall of the chest, so that when the lungs on either side is pressed aside, there is a serous sac often spoken of as the Pleural cavity. The air passages are kept permanently open during ordinary breathing by the elasticity of their tissues.

The Trachea and the Bronchi have special cartilaginous springs for the purpose. These are closely attached to the elastic tissues, which complete the general foundation with the walls of the tubes. From a mechanical point of view, the Thorax may be regarded as a specially arranged bellows, whose dimensions can be increased in all directions, Within this bellows, the lungs are situated which may be regarded as an elastic bag, the interior of which communicates with the outer air by an air pipe, this being the only way by which the interior of the lungs can receive the air.

When the frame work enlarges, the pressure of the atmosphere forces a stream of air into the elastic sac so as to distend it, and thus fill the space caused by the expansion. By the motions of this

frame work, the stream of air passes in and out of the lungs, and a small quantity of the air is in this way changed at each breath, and a certain standard of purity attained.

In order to fully understand all the accessory motions, by which breathing is carried on, a very much better knowledge of anatomy of the chest and its muscles, than I have space to give in this place is required. The motions are divided into two sets: Those which enlarge the cavity, and cause the air to rush into the lungs, is called inspiration, and those which diminish the size of the cavity and force out the air is called expiration.

There is no action of life, which is more familiar to everyone than the steady movements of respiration. The slow quiet rise and fall of the chest and abdomen are the signs most commonly looked for, as indicating existing life, for everyone knows that constant ventilation must go on in the lungs in order that the blood may readily obtain the required amount of Oxygen, and get rid of its end product, that is, Carbon-dioxide.

The rate of the respiratory movements is up to a certain point under voluntary control, and can be varied by the will, or even stopped for a short time, as when one holds his breath. This control of the respiratory movements is at any rate very limited, for if we hold our breath for any length of time, a moment soon arrives when the necessity of respiration overcomes the strongest will. The usual respiratory movements are carried on without our being conscious of them, and are strictly involuntary. The rate of the respiratory movement varies according to the circumstances, being

in an adult man about 18 per minute. In most of the lower animals, it is more rapid. It varies with the age, being very rapid at birth, decreasing slowly till about thirty years, and slightly rises in old age.

Muscular exercise increases the rapidity of the respiratory movements and the effort of standing produces a more frequent respiration, than is found in the recumbent posture.

Emotions very easily affect the rate, and rhythm of inspiration and expiration, and finally diseased conditions, especially those of the lungs, for the most part cause a frequency of respiration. Sometimes going as high as sixty or seventy respirations per minute.

The Thorax is enlarged in all directions during inspiration. The vertical diameters increase during inspiration by the descent of the latter portion of the diaphragm, and by slight elevation of the parts about the apex of the lungs, the movements of the diaphragm depress the abdominal viscera, and thereby distend the abdominal wall, thus the movements of the diaphragm cause a rhythmical heaving of the abdomen. Respiration, depending chiefly on the action of this one muscle, is therefore spoken of as Abdominal Respiration; on the other hand when the ribs are the chief cause of the extension, it is called Thoracic Respiration. Anyone can imitate these respiratory movements voluntarily. These two forms of respiration are variously combined in different individuals.

In men, the general character of the ordinary required respiration is abdominal, the movement of the Thorax being insignificant, as compared

with the abdomen. In women, the reverse is the case. The abdominal movements are slight, when compared with the movement of those in the upper part of the Thorax. This difference is only well marked during quiet unconscious breathing. Any forced or voluntary respiratory effort, changes the character of man's breathing, and the costal movements become more prominent. In a forced deep inspiration, the upper part of the chest, shows the greatest increase in the antero-posterior diameter in both sexes. This difference in type between male and female respiratory movements have been assigned to different causes. It has been urged that this change is brought about by the costume, ordinarily adopted by females.

This can hardly be a sufficient explanation; we find the same type existing, when the tight garments are removed, and its apparent in those, who have never been constricted by tight clothing, and even in those, who wear no clothing, as among some barberous tribes of hot countries. So that the corset may induce an exaggeration of the costal or Thoracic respiration by constricting the lower ribs and interfering with the action of the Diaphragm but it does not seem sufficient to account for the normal Thoracic type of breathing found in women.

The occasion of the distension of the abdomen during pregnancy has also been assigned as a cause of the female type of breathing, but it is very unlikely that pregnancy is the sole agency in the producing of it. Since the Thoracic type of breathing is sufficiently well marked in the female child, that this type of breathing should be transmitted to females from their ancestors is the most plausible

explanation. On the other hand the abdominal breathing of the male is also increased by heredietary transmission, but is also said to be due to the gradual increase in development of the muscles of the upper extremities. During quiet breathing, expiration requires no muscular effort.

Expelling of the air from the chest is accomplished by the elasticity of the parts. A powerful expiratory force in the elasticity of the lungs, which are on the stretch even after a forced expiration. The ordinary shape of the elastic walls of the chest corresponds with the position at the end of gentle expiration, for that reason the resiliency of the muscles and cartilages of the ribs, as well as other elastic tissues, which are stretched during inspiration, tends to restore the ribs to the position of expiration.

After death when the elasticity of the expiratory muscles is lost, the traction exerted by the lungs on the Thorax reduces it below the size its own elastic equalibrium would tend to assume. When, therefore air is admitted to the Pleural cavity by puncture, the Thorax slightly expands, and the lungs shrink. The pressure on the Pleural surface becomes equal to the pressure in the Bronchial tubes.

During respiration the volume of inspiratory and expiratory stream of air is quite small in comparison with the volume of the air sojourning in the lungs. After an ordinary expiratory motion, one can force out a great quantity of air by voluntary effort, but even after this is gotten rid of there is a considerable amount of air in the lungs. This air is called the residual air. Some of this residual

air, which never leaves the chest, during the life of the animal, is pressed out by the elasticity of the lungs, when the Peura is opened, but a certain amount of air cannot be removed from the lungs by any process.

In order to have a clear idea of the volumes of air at rest and in motion, during the ventilation of the lungs, it is convenient to follow the classification from which the nomenclature in common use has been taken. Tidal air, is the current of air, which passes in and out of the air passages in quiet natural breathing. It amounts to about 30 cubic inches in the adult, but varies considerably, being sometimes above this and sometimes below it.

Reserve air, is the air, which can be forced out of the lungs after the Tidal Air is out, and of course, ordinarily remains in the lungs; this too varies in quantity, but in the adult approximates one hundred cubic inches.

Complemental air, is the air, that can be forced into the lungs after an ordinary inspiration. It, too approximates about one hundred cubic inches in the adult.

Residual air, is the volume, which remain in the lungs after a forced expiration, and as before stated, can't be gotten rid of during life. In the adult it averages about one hundred and twenty cubic inches.

The vital capacity, is a term, that means the greatest amount of air, that can be forced out the lungs following a forced inspiration, so that it equals the Tidal reserved and Complemental Air. In the true sense of the term, it is often difficult to estimate the vital capacity. It is estimated

by the capacity of the chest, the power of the respiratory muscles, the resistance offered by the elasticity or rigidity of the walls of the thorax, the working capacity of the lungs, their extensibility and freedom from disease, it therefore varies greatly according to the age, sex, position of the body, the occupation, weight, height, the fullness of the hollow viscera of the abdomen, and the pathological condition of the lungs. It can be very much increased by practice, and this fact aside from the injury, that forced respirations may produce in the diseased state of the lungs, renders it unsuitable, as a gauge in diseases of those organs.

From what has been stated, it appears that the volume of air, sojourning in the lungs, during natural breathing, would approximate 220 cubic inches in the adult, while the fresh air introduced at each breath only amounts to about thirty cubic inches, or in otherwords, about one seventh of the air of the lungs is changed at each breath. As the stream of air enter the passages, that lead into the lungs, they produce sounds, which are of very great importance to the Physician, owing to the manner in which their character may be changed by disease. A sound called Bronchial breathing is produced in the large Bronchial tubes and Trachea, and is like the noise of the air blowing through a tube. This can be heard over the Trachea or at the back between the shoulder blade or at the entrance of the large tubes into the substance of the lungs. Another sound, that is called Vessicular can be heard in healthy individuals all over the chest. With the exception of the uncovered part of the

Heart by lung. This sound is most distinct where the lung is most superficial, as in the subaxillary region. It is a gentle rustling sound, caused by the air passing into the air cells. It varies much with the force of the respiration, and many other circumstances. In children up to 10 or 12 years of age, it is sharper and louder than in the adult.

MODIFIED MOVEMENT OF THE RESPIRATORY MUSCLES.

Besides the ordinary respiratory motions, and the voluntary modifications made use of in speaking and singing, the muscles of respiration perform a series of movements of an involuntary reflex nature, which are indications of certain motions and mental states.

The following are the more important:

Coughing is caused by an offensive irritating substance, which may be located in any part of air passages. It consists of a deep inspiration and closure of the Glottis, and then a more or less violent or expiratory effort accompanied by two, three more or less sudden openings and closures of the Glottis, so that rapidly repeated blasts of air pass through the upper air-passages and the mouth, which is generally held open.

Sneezing is caused by a stimulant applied to the nose or eyes, the impulses being carried to the respiratory center, by the nasal or other branches of the fifth nerve. It consists of a deep inspiration and closure of the Glottis followed by a single explosive expiration and sudden opening of the Glottis, with some facial distortion. Sneezing is purely a reflex act, since it cannot be produced

voluntarily, other than by the stimulation of the nasal mucus membrane.

Laughing consists of a full inspiration followed by a long series of very short rapid expiratory efforts.

The facial muscles are at the same time thrown into a characteristic set of movements.

Crying is made up of a series of short sudden expirations with peculiar contortions of the face, and with shedding of tears often associated with sobbing.

Sobbing consists of a rapid series of convulsive inspiratory efforts, which allows but little air to inter the chest.

Sighing is a long slow inspiration, quickly followed by a corresponding expiration.

Yawning is a very long deep inspiration, completely filling the chest. It is usually accompanied by a peculiar depression of the lower jaw, with a wide open mouth and a stretching of the limbs.

Hiccough is an unexpected inspiratory spasm, chiefly of the Diaphragm, the entrance of the air being checked by the sudden closure of the Glottis.

CHAPTER XVII.

VOICE AND SPEECH.

The human voice is produced by blasts of air being forced through the narrow opening at the top of the wind-pipe, called the Glottis.

The Glottis, which lies in the lower part of the Larynx is bounded on each side by elastic membranous folds, that project into the air passages. These folds are called the Vocal Chords, and are set vibrating by a current of air from the lungs, and in turn they communicate vibrations to the air, situated above them.

As the human voice is so very important a faculty, not only in the transactions of all forms of business, but that a cultivated voice is much more pleasant than a harsh disagreeable one, and as the voice admits of very extensive cultivation, I will here give a sketch of the anatomy of the parts concerned in voice.

The vocal apparatus produces sound in the same manner, as a musical wind instrument. If we compare it with the pipe of an organ, we shall find all the parts of the latter represented. The lungs within the moving thorax, act as a bellows. The bronchial tubes and the trachea are the supply pipes and the air-box, the vocal chords are the vibrating tongues, while the larynx, pharynx, mouth and nose act as the accessory or resonating pipe. The tongue assists in pronunciation and

casting sounds into words. The blast of air is regulated by the respiratory muscles, and special intrinsic muscles of the larynx change the condition of the vocal chords, so as to alter the pitch of the notes produced; other sets of muscles by altering the conditions of the resonating pipes, give rise to the many modifications in the vocal tones, and thus produce what is called speech.

The larynx, which may be regarded as the special organ of the voice is made up of four cartilages, the cricoid, thyroid and the two arytenoids, joined together so as to allow considerable motion; of these, the inferior or lower one is the cricoid. It is attached to the trachea which it joins to the others. It forms a ring, which is thin in front, but deep and thick behind, owing to a peculiar projection upward of its posterior part.

The thyroid consists of two side wings, so bent as to form the greater part of the anterior and lateral boundaries of the voice box and each wing can easily be felt in the front of the throat.

The arytenoid cartilages are little three-sided pyramids placed on the upper surface of the back part of the cricoid cartilage, and are attached to the latter by a loose joint. They are so placed, that one surface looks inward, and the third forward, while the inferior surface rides on the cricoid. One point looks forward, and to it is attached the vocal chord on each side, and has been called the vocal process. The apex, which looks outward and backward gives attachment to some of the intrinsic muscles and has been called the muscular process

The thyroid cartilage is connected with the Cri-

coid below and with the hyoid bone above by ligaments and tough membranes, which hold the parts together, fill in the intervals and complete the skeleton of the larynx.

The vocal chords are composed of small strans of elastic tissue, which pass from the anterior surface of the arytenoid cartilages to the inferior part of the thyroid, to which they are inserted.

The mucus membrane, which lines the larynx is thin, and closely adherent over the vocal chords. The surface of the laryngeal cavity is smooth and even, the lining membrane passing over the cartilages and muscles, so as to obliterate all ridges, except the vocal chords and a few others which are less sharply defined and are called the false vocal chords, which lie parallel to and above the true vibrating chords.

Taking the thyroid cartilage as a fixed base, the cricoid and the arytenoid undergo movements, which bring about two distinct sets of changes in the glottis and its elastic edges. First, widening and narrowing the opening, Second, stretching and relaxing of the vocal chords.

During ordinary respiration, the glottis remains about half open; during a forced inspiration, the glottis is widely dilated. If an irritating gas be inspired, the glottis is closed by a spasmodic action of certain muscles, so that the true vocal chords act something in the nature of a valve.

During vocalization the glottis is formed into a narrow chink with parallel sides, while the chords are made more or less tense, according to the pitch of the note to be produced. All these movements are executed by muscular action. The opening

of the chink of the glottis, is accomplished chiefly by a muscle called, the Posterior Crico Arytenoid, which passes from the posterior surface of the cricoid cartilage to the outer angles of the Arytenoids on either side. By pulling the latter part downward and backward, it separates the arytenoid cartilages, particularly at their anterior extremity, where the chords are attached. In this action it aids by a small muscle, connecting the posterior surface of the arytenoid, which tend when the two arytenoid cartilages are held apart to rotate them so that the vocal processes are separated.

The glottis is narrowed by the lateral crico Arytenoids which pass upward and backward from the cricoid to the muscular processes of the arytenoid cartilages. They pull the muscular process forward, and thus rotate the arytenoid cartilages, so as to approximate the vocal processes toward one another.

While any tendency toward pulling apart the bodies of the cartilages is over come by the Posterior-Arytenoid muscles, which are resisted by the bands of the muscles that pass from the back surface of the arytenoid cartilages to the epi-glottis, and the upper part of the Thyroid cartilage. The external-thyro-arytenoid and the thyro-ary-epiglotic muscles. The upper fibers, which pass directly from the arytenoid to the thyroid cartilages. The internal and external thyro-arytenoid muscle being in the same direction as the vocal chords, complete the closure by helping to press together the vocal processes, and by approximating the chords themselves.

In a spasmodic closure of the glottis, all these latter muscles act with violence together and are sometimes called the constrictors of the glottis.

Relaxation of the vocal chords accompanies the voluntary closure of the glottis, as in the holding of one's breath, when the vocal chords are said to have a valvular action.

The muscular fibers, which run from the Arytenoid cartilages to the Thyroid, nearly parallel to the vocal chords are those concerned in the act of relaxation, when the chords are active, they pull forward the arytenoid cartilages, and at the same time draw the upper part of the cricoid slightly forward. These muscles have all the important action of the adapting the edges of the chords in the neighboring surfaces to the exact shape, which is of most advantage in their vibration. The tightening of the vocal chords is caused by a single muscle, the crico-thyroid, which on the outer side of the larynx passes downward and forward from the lower part of the Tyroid to the anterior part of the cricoid cartilage. It pulls the anterior part of the cricoid cartilage upward, causing it to rotate round an axis, passing through its thyroid joints.

The upper part of the cricoid, which carries the arytenoids, moves backward, and the attachments of the vocal chords are separated, and the membranes are put on the stretch.

The requirements necessary for the production of voice are the following:

Elasticity of the vocal chords, and smoothness of their edges, freedom of surface irregularity, such as thick mucus adhering to them or any abnormality. The chords must be properly and accurately

adjusted, and closely approximated together so that they almost touch through their entire length, and they must be held in a certain degree of tension or when they vibrate, they cannot produce any vocal tone, but only a rough noise.

The air must be propelled through the Glottis by a forced expiration; the normal expiratory current is too gentle to give the necessary vibration. After the operation tracheatomy, the air escapes through the abnormal opening, and sufficient pressure cannot be brought to bear on the chords so no vocal sound can be produced. A person speaks in a whisper, unless the escape of air, through the opening of the tube is prevented, by placing the finger, temporaarily upon the opening.

The properties of the human voice are quality of pitch and intensity; the quality of the sounds of the voice is almost endless in variety. It would seem that no two persons have voices exactly alike. The sound of the human voice is regarded as a musical one.

The quality of any musical sound, depends upon the relative power of the fundamental tone, and of the overtones that accompany it. The less the fundamental tone is disturbed by overtones, the clearer and better is the voice; this difference in quality of the human voice depends upon the perfectness of the elasticity of the relation of thickness to length, surface smoothness and other physical conditions of the chords, themselves, and the exactitude with which the muscles can adapt the surfaces.

To sing well, much more is necessary than a good quality of tone; good tones, if they were cultivated,

are common enough. The muscles of the larynx, thorax and mouth to produce good tones should all be educated to an extraordinarily high degree. The pitch of the notes produced in the larynx, depends upon First, the absolute length of the vocal chords; this varies with the age, especially so in males, whose vocal organs undergo rapid growth at Puberty, and renders vocalization uncertain in tone from the rapid changes going on in the part, hence the voice is said at this age to break or crack; the vocal chords of women have been found by measurement to be about one-third shorter than those of men, and people with tenor voices have shorter chords than those, whose voices are bases. Secondly, it depends on the tension of the Chords; the tighter the chords are drawn by the Crico-thyroid muscles, the higher are the notes produced

Intensity or loudness of the voice, depends upon the strength of the current of the air. The more power the air blasts, the greater the amplitude of the vibration, and consequently the greater the sound.

The more narrow the chinck of the Glottis, and the tighter the parallel chords are stretched, the less is the amount of air and the weaker is the blast required to set them in motion, and conversely the looser the chords, and the more widely separated they are, the greater the volume of the force of the air current necessary for their complete vibration; hence it is, that an intense vibration or loud note can be produced much more easily with notes of a high pitch, than with very low notes.

The human voice, including every kind, is said to extend over about three and a half octaves. Of

this wide range an individual can seldom sing more than two octaves. During the ordinary vocal sounds, the air both in the resonating tubes above the Larynx and in the wind-pipe, coming from below is set vibrating, so that the Trachea and Bronchi act as resonators, as well as the Pharynx and Mouth. This may be recognized by placing the hand on the Thorax, when a distinct vibration is communicated from the chest wall. Such tones, for this reason are spoken of as chest notes. Aside of the chest tones of the ordinary voice, we can produce a higher pitch and of a different quality, which are called head notes, since this production is not accompanied by any vibration of the chest wall. The physical contrivance by means of this falsetto voice is produced is not very clearly made out.

The following are the more probable views:

First, it has been suggested that in a falsetto only the thin edges of the chords vibrate; the internal Thyro-arytenoid muscles, keeping the base of the chord fixed, while with chest tones a greater surface of the chord is brought into play.

Second, the chords are said to be wider apart in falsetto than in chest notes and consequently the Trachea ceases to act as readily.

Third, the chords may be so arranged so that only one part of them can vibrate, and hence they act as shortened chords or a stop, being placed on the point where the vibrations cease, by the internal Thyro-arytenoid muscles, the production of a falsetto voice is distinctly voluntary, and is most likely dependent upon some muscular action in immediate relation to the chords, where it is always

associated with the sensation of muscular exertion in the Larynx, as well as the changes that take place in the conformation of the mouth and other resonating tubes.

The nervous mechanism by means of which vocal sounds are produced, are among the most complexly co-ordinated actions that regulate muscular movements.

Like respiration, vocalization at first, seems a simple voluntary act. Sounds of various kinds will be produced by the individual. There can be no doubt, that the respiratory muscles, which work the bellows of the voice organ, are under the control of the will so long as the respiration is not interfered with.

The muscles of the mouth and throat, which shape the resonations, are also voluntary. but the intrinsic muscles of the Larynx are only voluntary to a certain degree, while in another, they are distinctly involuntary, as seen in the spasm of the Larynx, for they are in part, at least controlled by impulses, which arise at the organ of hearing and pass some co-ordinating center, which arranges the finer muscular movements necessary to produce a certain note.

When we sing a note, just struck on a musical instrument, we set the mouth and the special vocalizing muscles in readiness by a voluntary act, for the proper application of the air blast, but the tuning of the vocal chords is accomplished for the most part at least by reflex impulses, arriving from the ear in a special co-ordinating nervous center, the education of which is in advance of that of the voluntary centers, and for that reason can only

be controlled by the latter in persons especially educated in singing.

Some persons, who can sing a given note, with promptness and exactitude without any effort would find much difficulty in overcoming by volition the accuracy of this perfect reflex mechanism; in fact, a person with a naturally good ear finds it difficult to sing out of tune, even if he try to do so, although, we feel that we have command over the pitch of the sounds produced in the Larynx, we owe a great deal of our accuracy to the aid given us by our sound appreciating organs and the nerve centers in connection with them. The variations of the vocal sounds, which give rise to speech, are not altogether produced in the Larynx, but in the throat mouth and nose.

When unaccompanied by any vocal sound, speech only gives rise to a whisper, but when a vocal tone is at the same time produced, we have the ordinary loud speaking, and as vocal tones can only be produced by expiration, we can only speak aloud by means of an expiratory current of air, but an inspiratory current may be made to give rise to a kind of a whisper. Speech is composed of two kinds of sounds, in one of which the two sounds must be accompanied by a vocal tone, and are called vowel sounds, and in the other no vocal tone is necessary, but change in shape take place in the resonating chambers, so as to give rise to the noises called consonants.

As the pronunciation of the consonants is always accompanied by some vowel sound, and as the difference between the vowels is brought about by changes in the shape of the mouth, the distinction

between the two sets of sounds is rather artificial than real. The production of the different vowel sounds depends upon such a change being brought about in the cavity of the mouth that a resonator with a different individual note is formed for each particular word.

CHAPTER XVIII.

THE URINARY EXCRETION.

The Urine is the most important fluid excretion from the body. A large quantity of the waste products of the system is carried off in solution by the Urine. It has been said, that the amount carried off in this way, if allowed to remain in the system, would prove fatal in 24 hours.

The construction of the Kidneys, which are the organs that eliminate these substances, together with the Urine, is somewhat peculiar. The renal artery, after it enters the Kidney, breaks up into a number of small branches. These little vessels form arches, which run along the base of the pyramids; from these arches, small straight branches spring and pass toward the surface which again give off lateral branches and each finally pass into a Malpighian Capsule. Within these little capsules, these little arteries break up into fine tufts of Capillary loops, and can only be clearly seen by the use of the Microscope. These little tufts are called Glomeruli; these Glomeruli fills the ends of the tubules, and is only covered by thin scaly epithelial cells, and is in this way separated from Urine.

It is a peculiar fact that in the renal circulation the vessel leaving the Glomeruli, does not like most veinlets unite with others to form a large vein, but again breaks up into Capillaries, which form a dense net work around the convoluted tubules,

blood is then conveyed to small straight veins corresponding to the intralobular arteries.

Another peculiarity of the Renal vessels, is that it has another distinct set of arteries, starting from the same point as the intra-lobular pass to the center of the gland into the pyramids, that consist of branches of straight arterioles, which lie between the straight and the looped tubules.

Corresponding to these straight arteries, are minute straight veins, which deliver the blood back to the base of the pyramid; in the Kidney, then, we have three sets of Capillary vessels, which differ in their position, the form of their meshes, and their relation to their parent artery. It is likely that the pressure exerted by the blood in them by the rapidity of its flow through them differ also.

The Capillaries in the Glomeruli are loops, collected into a tuft by their covering of delicate epithelium. On account of their relation to the afferent artery, which ends abruptly in these Capillaries, and to the smaller afferent vessel, that leads to a secondary plexus of Capillaries. The pressure within the Glomerulus must be very great compared with that of the general Capillaries of the body. And must vary much with the changes in the local blood pressure. The walls of the vessels, in the Glomerulus are so constructed that they admit of the water passing through them, and carrying with the water in solution, Urea and other waste products

The Capsules, as before mentioned, called the malpighian Capsules are the ends of the urinary tubules, and it should be remembered by the reader that they enclose these arterial tufts, or Glomeruli.

Now, all these urinary tubules empty their contents into what is called the Pelvis of the Kidney, which is a little funnel shaped sac, and forms the head of the Ureters, The Ureters are two small tubes, that lead from the Pelvis of the Kidney on either side and empty into the base of the bladder. The points in the bladder where the Ureters enter are guarded by a fold of tissue, that acts like a valve in such a way that when the Urine enters the bladder, no matter how much it may become distended, the Urine can't go back up the Ureters. The Urine is constantly being excreted during life, as complete suspension of the function of the Kidneys is said to cause speedy death.

THE PASSAGE OF URINE TO THE BLADDER.

The pressure exerted by the blood in the Glomeruli, is quiet sufficient to make the Urine flow from the Pelvis of the Kidney, because when the Ureters are tied, they become distended above the ligature by the Urine flowing from the Pelvis, where a pressure may be produced of about forty millimeters, at which pressure, the secretion stops, and becomes somewhat changed in chemical composition, normally, however, the passage of the Urine along the Ureters is accomplished by the peristaltic motion of the ducts of the cells, which takes place alternately in the two Ureters; having reached the bladder, the Urine cannot return, as before stated, into the Ureters on account of the way the tubes pass through the walls of the bladder.

When the pressure increases in the bladder, the ducts become closed and acts as a kind of a valve. The Urine, which is continuously secreted and con-

veyed to the bladder is only voided at convenient times, therefore special arrangements exist for its retension and expulsion.

The retension of Urine in the bladder up to a certain point, depends upon the elasticity of the parts concerned; the dense elastic tissues around its outlet, being able to resist the elastic force being exerted upon its contents by the walls of the bladder and Viscera, thus where no active force can possibly come into play, as in the case of a dead subject or in complete paralysis following the destruction of the spinal chord, considerable amount of Urine is retained, but when a certain point is arrived at by a gradual accumulation of Urine within the bladder, the elasticity of the Sphincter, and the other tissues around the outlet is overcome by the elasticity of the bladder wall, and the Urine slowly dribbles away, but in a normal condition, the Urine is retained by a muscular mechanism, over which we have considerable control.

The Sphincter, which by contracting, helps the elastic powers of the tissues around the Urethra, and retains the Urine.

The accumulation of Urine after a certain time, gives a sensation known as a full bladder; this feeling is not always accompanied by the desire to make water, but in a short time it produces a desire in that direction.

And we suppose that the stimulant given to the afferent nerve, by filling the bladder reflexly causes a constriction of the Sphincter muscle, so that in proportion that the pressure within the bladder increases, the resistance with outflow is also augmented; this does not imply any automatic action

of the Sphincter Vesicae, but merely a constant reflex action on that muscle, which secures its contraction, and the retension of a considerable amount of Urine without any voluntary influences or retension.

When the bladder becomes very full, the reflex mechanism may require the assistance of the voluntary centers to augment this power, and prevent the Urine from being evacuated.

THE EVACUATION OF THE BLADDER.

The expulsion of the Urine from the bladder does not normally depend on the elastic forces alone, as in the case of a paralytic incontinence, when the urine commences to dribble away, as soon as a certain pressure is attained within the bladder, but is accomplished by the Detrusor-Urinae, a sheet of muscle, which lies in the wall of the bladder. Under ordinary circumstances, there is a relationship between the expelling and retaining powers, in which the retaining power of the Sphincter is just able to resist the elastic pressure. If the Urine be retained for a considerable time, the reflex stimulation of the Sphincter no longer suffices to keep back the fluid, and the voluntary effort has to be called to the aid of the reflex action of the Sphincter. If now, a drop of Urine happen to make its way into the sensitive Urethra, matters are altered; even voluntary effort does not suffice to keep back the stream, and an irresistable call to empty the bladder is made upon the spinal nerve mechanism. This is accomplished by the contraction of the muscular coat of the bladder, which is excited reflexly by the stimulus starting from the

mucus membrane lining the Urethra. When the Urine once commences to flow, it continues until the bladder is quite empty.

The sequence of events will then be, first, stimulation of the mucus membrane of the Urethra by a drop of urine. second, contraction of the Detrusor-Urinary muscle, third, relaxation of the Sphincter, fourth, Rhythmical contraction of the ejaculator-Urinae, and finally a contraction of the Levator-ani and neighboring muscles. The evacuation of the bladder under these circumstances is accomplished independently of the will by a reflex action, and we may even be unconscious of it. This reflex evacuation of the bladder may occur during sleep, as the result of slight local excitations. In infants, this is the natural way of emptying the bladder, and the gradual education of the centers, controlling the retension mechanisms is watched with interest in young children.

At an early age generally we learn to control the acts of these centers by our will; we feel a desire to empty the bladder before it becomes so distended, that the reflex contraction of the Sphincter is insufficient to retain the Urine, but the volitions serve to call into activity the reflex mechanism just described. Almost at any time we call forth the reflax act by increasing the pressure on the bladder by voluntary contraction of the abdominal muscle.

The Diaphragm being depressed and fixed, the muscles of expiration are put into action so as to press upon the present Viscera, at the same time the contraction of the Sphincter is probably checked by the will, and thus the power of retension is over-

come. The moment the balance of power is turned in favor of the expelling agencies, a drop of Urine reaches the beginning of the Urethra, and excites reflexly the spinal centers, and thus brings about the complete evacuation of the bladder without further voluntary effort.

The Urine of man, when freshly voided, is a clear straw colored fluid with a peculiar aromatic odor. The intensity of the color, varies with the amount of solids, the color being a rough indication of the degree of concentration. On standing and cooling, a slight cloud of mucus often appears floating in the fluid. This is generated by the lining membrane of the bladder. The fresh Urine has a distinctly acid reaction. This does not depend upon the presence of free acid, but upon the larger amount of acid salts, particularly acid sodium phosphate, which it always contains.

A strictly vegetable diet renders man's urine Alkaline, and it is said to become less acid after meals.

In the herbivorous mammalia, the Urine is normally alkaline, while their digestion is going on, but when they are deprived of food for some time, it becomes acid, thus showing that the alkalinity, depends upon their diet.

The specific gravity of Urine varies greatly at different times, but in health it generally ranges from a thousand and fifteen to a thousand and twenty, after copious drinking, and an abstinence from proteid food, and in cool weather it may fall as low as a thousand and three, and after being deprived of fluids for a considerable time, and from animal food, and by a very active sweating, it may

have a specific gravity as high as a thousand and forty.

The quantity of Urine secreted is also very variable. In health, an adult usually makes about two pints per day.

The amount is increased, first, by the general blood pressure or the pressure in the arteries from any cause whatever. second, the contraction of the vessels of the skin, as from cold, third, drinking copiously of water or any fluid that contains it, fourth, an excess of nitrogenous diet, fifth, the presence of soluble matter in the blood, such as sugar and salt, and sixth, the presence of Urea as well as various medicines has a special action on the renal secretion, greatly increasing the amount of Urine passed; although the quantity of Urine differs so much under different circumstances, the amount of solids discharged by the Kidneys in the twenty-four hours remains pretty near the same, being on an average of about an ounce and a half for an adult man; from this, it is clear that the height of the specific gravity must vary inversely with the amount secreted, so that the more scanty the Urine is, the higher we expect to find the percentage of solids.

The quantity of Urine excreted is diminished in a number of diseases, in fact, in almost all severe diseases, the function of the Kidneys is impaired, it therefore becomes an important duty of a Physician to pay particular attention to the quantity of Urine expelled. It has already been mentioned that in health an adult person discharges on an average of about two pints of Urine; now in severe fevers this quantity is always greatly diminished,

for an example; in a case of Typhoid fever, in the first ten days of the disease, this quantity would most likely be reduced to sixteen or eighteen ounces, then if the Urine is measured each day, and is found to be diminished one or two ounces every day, the patient is most likely getting worse, and when this quantity would be reduced four or five ounces in twenty-four hours, the case is most likely to be a very grave one, but in case the quantity is reduced to this low amount and begins to be restored again, or increased in amount it is almost a sure sign that the patient is getting better. It therefore, becomes a very important duty of the Physician in all severe fevers to look closely after the quantity of urine expelled daily.

The color of the urine should be noted, and when necessary a test be made for albumen, sugar, etc.

CHAPTER XIX.

THE NUTRITION OF THE BODY.

We are to some extent enabled to compare the intake and out-put of the human body, and are now in a position to see what light can be thrown by this comparison upon the changes, which take place in the body.

It is known that the income is made up of the same substances, that are found in the body and of course are taken in, in the form of foods.

Under the classes of food stuffs Albuminates or Proteids, fats, Carbo-hydrates, salts and water, which is necessary introduced into the stomach and Oxygen, which is taken by the lungs.

While the outgo consists of Urea and some other waste products, which are eliminated in solution by the Urine.

Carbon-dioxide, which is in the form of a gas is eliminated by the breath and the Feces, which is eliminated by the bowels and several indefinite substances eliminated by the mucus membranes, such as the air passages, and considerable waste go off by the skin together with a considerable quantity of water from all these ways of excretion. The milk ova and seamen may be omitted, as being devoted to special Physical purposes.

In order that the body shall maintain its healthy standard it is necessary that the income should at least be equal to the loss or out-put, that is, of

all the necessary constituents of the body, and where growth is going on this is not sufficient. The income in this case has to be equal to the expenditure plus an allowance for growth; it is known that animals can live a considerable time without food. in this case the expenditure is derived from the body itself. It is absolutely necessary to sustain life and therefore the outgoings must still continue.

It would appear that we ought to be able to arrive in a very simple manner at the smallest amount for maintaining the body at the standard named above, but in considering the many factors, that enter into the subject, it is not as simple a matter as might be supposed:

First, a considerable margin over and above this minimum quantity is necessary in order to establish the nutritive equilibrium, and second, that the portion of material eliminated and stored up in the body varies according as the amount taken is increased or diminished; third and finally the quality of the food, that is, the proportion of each group of food stuffs, that is present in the diet has a very important influence on the quantity required to establish the equilibrium, and that best suited to cause increase of weight or to fatten.

When deprived of food, those tissues upon the activity of which life immediately depends must feed upon materials stored up in some tissues of less vital importance to the animal. The first question to discuss is how much the body loses in daily weight during the time that it is feeding on itself and how fair the different individual tissues contribute to this loss. In making experiments upon animals, the loss of weight is directly estimated

by weighing the animal, and the loss of the individual tissues is made out by a careful analysis of all the excretions by which the exact amount of Nitrogen and Carbon-dioxide is ascertained.

The Nitrogen will correspond to the loss of muscle, and the Carbon, after excluding the part which is the outcome of muscle change, which may be calculated from the Nitrogen corresponds to the fat burned off or oxidized in the system.

It has been found that a starving animal loses weight most rapidly at first or in other words just after being cut off from food and later on more slowly. The cause of this difference is that the food last eaten continues to have an influence during the first three or four days, and the materials eliminated are in proportion larger in quantity. When the influence of food prior to starvation has ceased, the daily amount of materials eliminated is much reduced, and remain nearly constant, decreasing slightly in proportion as the body weight diminishes until the animal dies. Adult animals generally live until they have lost about half their normal body weight, when placed on starvation. Young animals however, do not bear starvation to a like extent and generally die, when they have lost twenty per cent. of their weight.

An animal fed on a quantity equal to the output during starvation, continues to lose weight, and the quantity of nitrogenous substances eliminated is in excess of the low standard found during complete abstinence from food. From this, we might conclude that even when supplied with an amount of nitrogenous material equal to that used by the tissues during starvation, an animal takes a further

supply from its own texture, and eliminates some of the nitrogenous nutriment without making use of it.

The body subsists on the scanty allowance of nourishment it gets from the tissues during starvation only so long as there is absolutely no food income. When food is supplied, there is always an increased expenditure set up.

The income is exceeded and the deficiency occurs in the nitrogenous balance, most likely some of the nitrogenous nourishment is rendered useless by the processes which it undergoes in the digestive apparatus; even then the quantity is not sufficient to support the equalibrium. It might be concluded then that feeding an animal on an amount of food, exactly corresponding to the quantity of nourishment, taken from the tissues, when totally deprived of food is only a slower form of starvation. In the case, in which a nutritive equalibrium is exactly maintained so that the body weight remains unaltered is the most important one for us to determine, since the settlement of this question would enable us to fix the most beneficial standard of diet. Unfortunately, this case is also one of the most difficult to come to a satisfactory conclusion, even when the amounts of gain and loss exactly correspond, we are yet unable to say that we have the best dietary, because some of the income of food taken may be altogether useless, and pass out of the body without performing any function whatever.

It has been seen that the relative amounts of the out-put and the materials stored up in the system are altered and regulated by the amount of

income, and we find that the quality of the income, that is, the relative proportions of the various kinds of food has a very material influence on the materials stored away in the system, and that which is eliminated from the body.

Different animals appear to have very different powers of assimilation, and under varying circumstances the requirements of the assimilative power of the same animal may vary. An animal fed upon a purely meat diet, requires a great amount of it to sustain his body weight.

It has been found by experiment, that at least one twentieth of the body weight of a lean meat diet, given daily is necessary to keep an animal alive without either losing or gaining weight. If more than this amount be given, the animal may increase in weight, and as its weight increases, a greater amount of meat is required to keep it up to the new standard so that the progressive increase of weight with a purely meat diet is to keep on increasing the quantity of meat diet given.

The effect of a diet without any albuminates whatever is that the animal dies of starvation nearly as soon as if deprived of all forms of food. The addition of fat or sugar to meat diets allows a considerable reduction in the supply of meat, both the body weight and the nitrogenous tissue change, preserving their equalibrium on a much less amount of food, and further fats and sugars, which obviously cannot form a sufficient diet for the reason that they contain no nitrogen appear to have the power of accomplishing some end in the body which without them, requires a considerable expenditure of materials or food stuffs, con-

taining Nitrogen. Fats and sugars, then supply the body with readily oxidized materials and thus shield the albuminous tissues from oxidation, as well as reduce absolutely the nitrogenous metabolism.

The last case we have to consider, is that in which the supply of food material is in excess of the requirements of the body. This is regarded as the most common case in man. Much of the food taken never really enters the system, but is conveyed away by the eliminative organs without being utilized by the system. We may say then that all food stuffs are destined to feed the living cells, whether it be in the form of gland cells of the connective tissues of muscle cells, so that all food stuffs, that are really assimilated contribute to the maintenance of the body, and subserve its various functions. Some produce fat, some Glycogen and others manufacture the various substances we find in the secretions, while yet others are devoted to setting free the energy of the various chemical changes taking place in the body, but all the food we eat is not assimilated. Indeed, the destiny of many of the ingredients of our complex dietaries is not easily traced out.

The question of the exact amount of the various food stuffs to form the most wholesome dietary is one of very great practical importance, and would require a more elaborate discussion than can here be given. As a rule, men, like other animals partake of food largely in excess of their requirements, when they are able to obtain it. It is well known that very fat persons are not those, who consume the largest amounts of food.

An adult man should be well nourished if he be supplied with the following daily diet:

Albuminates	3 ounces.
Hydro-carbons or fats	3 ounces.
Carbo-hydrates or starches & sugars	10 ounces.
Mineral Salts	1 ounce.
Water	3 pints.

As a matter of fact, many persons can and do thrive on a much less quantity than is indicated in the above table. Individual taste commonly selects foods with too much of the Albuminates. Upon the whole a mixed diet is by far the best.

CHAPTER XX.

THE PHASES OF HUMAN LIFE.

One of the most interesting, as well as one of the most peculiar conditions connected with our being might be called THE PHASES OF HUMAN LIFE.

In the beginning of human life a very strange occurrence takes place that has been discussed by physiologists from time immemorial, and no more seems to be known of its cause at the present day than in former times.

After the female becomes pregnant, in spite of the womb enlarging most rapidly for nine months, or near that period, until it assumes an enormous size, no contractions are set up to expel its contents. At about the end of the ninth month contractions will be set up and it is very surprising to see the force there is in a sheet of muscle aided by the abdominal muscles, to drive out the contents of the uterus, which is the child.

The development of the child is somewhat in this order. It is chiefly by the accumulation of muscle or flesh that the child acquires the bulk and weight of the man. The skeleton frame work, in spite of its being specifically lighter in its earlier condition, maintains throughout life, about the same relative weight.

The increase in stature or height is very rapid in early infancy; proceeding however by decrease in degrees. According to some physiologists there

is a gain of 5 or 6 inches during the first year in height. During the second year, probably 4 or 5 inches; during the third year, 3 or 4 inches in height is usually gained, and so on, decreasing to 2 or 3 inches and still lower to maturity.

During or shortly before puberty there is again a somewhat sudden rise with a subsequent more steady, but diminishing in increase up to about the twenty-fifth vear. From thence to about fifty years of age the height remains stationery, after which there may be a decrease, especially in extreme old age. The increase in weight is also very rapid at first, and proceeding like the height, with diminishing degrees, may continue until about the fortieth year. After the sixtieth year there is a slight decline very generally witnessed. It is a remarkable fact however that in the first few days of life, so far from there being an increase there is an actual decrease of weight. Even at the seventh day the weight is a little less than it is at first. The heart of the baby, as related to its body weight, is larger than the adult; and the frequency of the heart beat, much greater. The pulsations at birth are generally from 130 to 140 a minute, falling to about 110 pulsations per minute in the second year; and by the time the child is ten years old its pulse at rest is in the neighborhood of ninety per minute.

Corresponding to the small bulk of the body the whole circuit of the blood system is traversed in a shorter time than in the adult. It only takes about twelve seconds for the blood to traverse the whole body in the infant; and in consequence of this renewal of the blood in the tissues is exceedingly rapid. The breathing of the child is much

quicker than that of the adult; being at first about thirty-five per minute, falling to twenty-eight per minute in the second year, and thence to twenty-six in the fifth year, and so on.

The respiratory work, while it increases absolutely as the body grows, is as related to the body weight, greatest in the earlier years. It might be noted that the absorption of oxygen is said to be relatively more active than the production of carbon-dioxide; that is, there is a continued accumulation of capital in the form of a store of oxygen holding explosive compounds. This indeed, is the striking feature of infant metabolism. It is a metabolism directed largely to constructive ends. The food taken represents so much potential energy, but before that energy can assume a vital mode the food must be converted into tissue; and in such a convertion, a large amount of energy must be expended.

The metabolic activities of the infant are more pronounced than those of the adult; for the sake not so much of energies which are spent on the world without, as of energies which are for awhile buried in an increasing mass of flesh. Thus the infant requires over and above the wants of man; not only an income of energy corresponding to the energy of the flesh actually laid on, but also an income corresponding to the energy used up in making that living flesh out of the dead proteids, fats, carbo-hydrates, and salts, which serve as food, and were discussed in the beginning of this book. Above this the infant needs a more rapid change of tissue or metabolism to keep up the body temperature, which is no less but indeed is often found

slightly higher than the temperature of the adult, and it requires a greater expenditure in as much as the infant, with its much greater surface according to size, and its extreme vascular skin loses heat to a proportionately much greater degree than does the grown up man; and it is well known that children are far more easily affected by cold than adults. This rapid metabolism is however manifest immediately after birth. During the first few days, the time during which the body loses weight, which has already been mentioned, the breathing activities of the child are feeble. The embryonic habits seem as yet not to have been completely thrown off, and in consequence a new borne baby can bear with impunity a deprivation of oxygen which would be fatal to it later on in life.

The quantity of urine passed, though scant in the first two or three days, rises rapidly at the end of the first week, and in youth the quantity of urine passed is as related to the body weight, larger than it is in the adult, This may be, at least in quite early life, due to the more liquid nature of the food, but is also in part the result of the more active metabolism; for not only is the quantity of urine passed, but also the amount of urea and some other urinary constituents excreted as related to the body weight, greater in the child than in the adult. The presence of the various acids, which occur in urine are more abundant, and their abundance is characteristic of the urine of children. Associated with these constructive labors of the growing frame is the prominence of the lymphatic system. Not only are the lymphatic glands largely developed

and more active, but the quantity of lymph circulation is greater than in later years.

Characteristic of youth is the size of the thymus body which increases up to the second year and then it remains awhile stationary; but generally before puberty it has undergone retrogression, and in the adult there is hardly a vestige of it remains.

Our knowledge of the details of the working of the nervous system and the condition of the mind in early infancy is too obscure to allow of any very profitable discussion. It might be said that in the young child the whole nervous system is more excitable than in later years, by which we mean that it is less rigid, less marked out and spoken of as nervous mechanisms.

According to some physiologists who have made a number of experiments upon animals, given areas in the brain of new-borne animals does not give rise to the usual localized movements. The sense of touch, both as regards pressure and temperature, appears to be well developed in the infant as does also the sense of taste. According to some the sense of smell is not so acute as it is in the adult. The pupils of the eyes, which are larger than in the adult, from the outset appear to be fully sensitive to light; 'though vision is not perfect as it is in the adult. As regards hearing on the other hand, very little reaction follows upon sound. Hearing seems to be very dull; especially during the first few days of life. This is likely in part, due to absence of air from the tympanic cavity and the swollen condition of the mucuous membrane of the ear. As the child grows up his senses rapidly culminate and in his early years he generally has a cuteness of vision,

hearing and touch, which frequently become blunted as his psychical life becomes fuller. Children however, are said to be less apt at distinguishing colors than in discerning objects; but it does not appear clear whether this is owing to a want of perceptive discrimination or from their being actually less sensitive to the variations in hue. A peculiar characteristic of the nervous system in childhood, which is thought to be the result of the more active metabolism of the body is the necessity for a long deep sleep. The appearance of the teeth marks the first epoch of a new life. At about seven months the two central incisors of the lower jaw make their way through the gum followed immediately by the corresponding teeth in the upper jaw. The lateral incisors first of the lower and then of the upper jaw appear about the ninth month. The first molars at about the twelfth month, the canines at about a year and a half, and the temporary dentition is completed by the appearance of the second molars usually before the end of the second year. About the sixth year the permanent teeth begin to make their appearance by the appearance of the permanent molar beyond the second temporary molar. In the seventh year the central permanent incisors replace their temporary representatives; followed in the next year by the lateral incisors. In the ninth year the temporary first molars are replaced by the first bicuspids, and in the tenth year the second temporary molars are replaced by the second bicuspids. The canines are exchanged about the eleventh or twelfth year; and the second permanent molars are cut about the eleventh or twelfth year.

There is then a long pause. The third or wisdom tooth does not make its appearance until the 17th or even 25th year; or in some cases not appearing at all. Shortly after the conclusion of the permanent dentition, with the exception of the wisdom teeth, the occurrence of puberty marks the phase of a new life; and the difference between the sexes, which has been merely potential now becomes functional. In both sexes the maturation of the generative organs is accompanied by the well known changes in the body at large, but the events are much more characteristic in the female than in the male; 'though in the boy the breaking of the voice and the rapid growth of the beard which accompany the appearance of active spermatozoa are striking features; yet they are after all superficial. The curves of his increasing weight and height and of the other events of his economy pursue for awhile longer, an unchanged course. The boy does not become a man until some years after puberty, and the decline of his functional manhood is so gradual that frequently it ceases only when disease puts an end to a ripe age. With the occurrence of menstruation at from thirteen to seventeen years of age, the girl almost at once becomes a woman; and her functional womanhood ceases suddenly at what is called the climacteric or change of life. In the fifth decade or from forty to fifty years of age, during the whole of the child bearing period, she is in a comparatively stationary condition; while before the age of puberty up to about the elventh or twelfth year the girl is lighter and shorter than the boy of the same age. In the next few years her rate of growth exceeds his. She has

then nearly reached her full development while the boy still continues to grow. Her curve of weight from the nineteenth year to the climacteric remains stationary; being followed later by an increase as a rule; so while the man reaches his maximum weight at about forty, the woman is at her greatest weight at about fifty.

Of some of the peculiar differences of the sex such as the formation of the pelvis and the costal mechanism of respiration are directly connected with the action of childbearing, while others have only an indirect relation to that duty, and indications at least of nearly all the characteristics are seen at birth.

The boy is heavier and taller than the baby girl, and the maiden of five breathes with her ribs in the same way as does the matron at forty. The woman is lighter and shorter than the man. The muscular system and the skeleton are lighter and less in the woman than in the man, and the brain of woman is lighter and smaller than that of the man. Her metabolism as measured by the respiratory and urinary excreta is also less to the body weight, and her blood is less in quantity, but its specific gravity is less, and the proportion of red blood corpuscles are less. Her strength is considerably less, and her step is shorter.

From birth the increase of growth progressively diminishes, and at last a point is reached at which the curve cuts a line and the increase is converted into a decrease. After the culmination of manhood at forty, and womanhood at the climacteric, the prime of life declines into old age. The activity of the body, which at first was sufficient, not only

to cover the daily waste, but to add new material, later on is able only to meet the daily wants, and at last it is too imperfect even to sustain in its entirely the existing frame. Neither as regards vigor and capacity of function or as regard weight and bulk do the turning point of the several tissues and organs coincide either with each other or with that of the body at large.

The eye is in its dioptric prime in childhood, when its media are clearest and its muscular mechanism most mobile, and then it for the most part serves as a toy. In later years when it could be of the greatest service to a brain that is still very active it is often fallen into a clouded and rigid old age. The skeleton reaches its limit very nearly at the same time, as the whole frame reaches its maximum of height. In a similar manner the muscular system in its increase corresponds with the weight of the body. The brain in spite of increasing complexity of structure and function, to which it continues to attain even in middle life, early reaches its limit of bulk and weight. At about seven years of age it attains what is considered as its first limit, for although it may increase somewhat up to twenty, thirty or even later years its increase in weight is very much slower than before seven. The vascular and digestive organs as a whole, generally continue to increase even to a very late period. From these facts it is clear that though the phenomena of old age are at the bottom, the result of the individual decline of the several tissues, they owe many of their features to the disarrangement of the body produced by

the premature decay or disappearance of one or other of the constituent bodily factors.

There are two changes peculiar to old age; calcareous and fatty degenerations. In the former of these changes the tissues are hardened and more readily break down or become of less service so that when it takes place in the vessels as the great arteries at an early period of life, which is not very common, the man will be called an old man, for a rigid artery is liable to break down at any time as in appoplexy, and hemorrhage of the lungs, and kidney disease. In the last named, or fatty degeneration, instead of the fat being a store to draw upon it often becomes a burden, and is found in unsuitable situations; about the heart for instance, which becomes a disturbing factor and often proves fatal. Of the various tissues of the body, the muscular and the nervous are however with those in which functional decline if not structural decay, as a rule soonest make their appearance. The co-efficient strength of the skeletal muscles generally diminished after forty years of life, and a similar want of power comes over the plain muscles also. The heart for instance, 'though it may not diminish, or even it may still increase in weight, possesses less and less force; and the movements of the intestines, bladder and other organs diminish in vigor.

In the nervous system the lines of resistance which we have seen, help to map out the central organs into mechanisms becomes weakened; the eye becomes feeble; not only from the cloudiness of the media and presbyopia, but also from the very obtuseness of the retina.

The Sensory and motor impulses pass with increasing slowness to and from the central nervous system, and the brain becomes a more and more rigid mass of nervous cells, the molecular lines of which mark the history of past actions than serve as indications of present potency. The glandular elements seem to be those whose powers are the longest preserved; and the man who in the prime of his manhood was a martyr to dyspepsia by reason of the sensitiveness of his gastric nerve and reflex inhibitory and other results of their irritation in his later years when his nerves are blunted and when therefore his peptic cells are able to pursue their chemical work undisturbed by extrinsic nervous worries, eats and drinks with the courage and success of a boy.

Within the range of a lifetime are comprised many periods of more or less frequent recurrence. In spite of the aids of a high civilization all tending to render the condition of his life more and more equitable man still shows in his person the effects of the seasons. Some of these are the direct results of varying temperature, such as the gain of weight in winter and the loss in summer.

Within the year an approximately monthly period is manifested in the female by menstruation, but there is no similar latent cycle in the male. The peculiarity of recurrent diseases and the critical days of some diseases may be regarded as pointing to cycles of small duration; but these cycles are no doubt due in some diseases to the life and activity of micro-organisms. Prominent among all other cycles is that man must night after night or day after day, or at least time after time lay

down to sleep. The salient feature of sleep is the cessation of the automatic activity of the brain. All parts of the body either directly or indirectly take part in it. The pulse and breathing are slow, the intestines and other internal muscular mechanisms are more or less at rest; the secreting organs are less active, and the whole metabolism and the dependent temperature of the body are lower; but we are unable to say how far these are the indirect results of the condition of the nervous system; or how far they indicate a partial slumbering of the several tissues. We are not at present in a position to trace out the events which culminate in the inactivity of the brain. It has been argued that during sleep the brain is anemic; or in other words that blood does not flow freely to the brain.

The anemic condition of the brain is more likely the result of sleep than its cause. Truly enough when the heart is in an excited condition and engorges the vessels of the brain it hinders sleep, but it is hardly reasonable to believe that a moderate amount of blood sent to the brain would hinder sleep. The cause of sleep would more likely have to be sought in the condition of the cells of the brain It resembles the heart inasmuch as irritability is lowest at the beginning of the diastole and increases onward until a beat burst out; so is sleep deepest at its commencement after the day's labor; then it becomes slighter and slighter stimuli are needed to awake the sleeper. As to the changes that take place in the cells of the brain during sleep we know very little. Physiologists have studied the subject by experiments on animals and otherwise but they still leave the subject very obscure.

In order to promote sleep one should lie down. Comfort contributes considerably to sleep. The health of the individual influences sleep; the state of the mind influences sleep materially. In order to sleep one should dismiss from his mind all cares of business. In case a person suffers from inability to sleep a warm bath often promotes sleep just before going to bed. Stimulants like coffee and tea are a hinderance to sleep. An ill ventilated room will often disturb sleep.

Persons when they are very hungry cannot sleep well. Those who suffer from sleeplessness can sometimes get relief by taking a supper just before retiring, like sweet milk. When natural sleep can be produced it is always better than to take drugs, but sometimes it becomes necessary to have recourse to drugs, but it is not advisable to use them night after night, as the person is likely to form a habit and possibly be unable to sleep entirely without them.

Exercise and labor promotes sleep, and persons that suffer from insomnia should not fail to take the proper amount of exercise during the day; but too intense exercise of the mind often produces insomnia; so persons who wish to promote sleep should learn to change off from any annoying business that requires intense mental application. The cycle of the day is manifested in other ways than by the alternation of sleeping and waking. With all the indirect effects of these conditions, there is a diurnal curve of temperature which appears independent of all the immediate circumstances; the hereditary impress of long ancient sequence of days and nights. Even the pulse,

which are so sensitive to all bodily changes shows running through all the immediate effects of the changes of the minute and the hour, the work of an influence which cannot be accounted for by waking and sleeping; and the same may be said concerning the rythm of respiration and the products of the lungs, skin and urinary excretion. It would appear that there is a daily curve of body metabolism which is not the product of the day's events, and lastly, as the fundamental fact, of all bodily periodicity is that alternation of the heart's systole and diastole which ceases only at death. The flow in the arteries is toned down in the capillaries to an apparently continuous flow; still the constantly repeated cycle of the heart's activity must leave its mark through the whole webb of the body's life.

DEATH.

Each individual, man, woman or child, might be said to represent a unit of a great generation passing through time. Statistics show that the average of human life in the government of the United States is a little higher at the present than it has been in a great while. The expectation of life from birth is now forty years. Expectation of life does not mean just how long one might expect to live; it means the average of human life from any given period.

After one passes from childhood, the expectation of life is increased a little, which again falls and gradually falls, up to the extreme limit of age. Thus the expectation of life of an individual at thirty years is thirty three years, which is now fallen from

what the expectation of life is from birth. This does not mean that a man at thirty might expect to just live thirty-three years; it means that a large number of persons taken at that age; say every man in the United States, at the age of thirty years, live upon an average, thirty-three years, the whole of which will be sixty-three years; so the expectation of life at thirty years would be thirty-three years plus the time he had already lived, which is thirty years. Then as we advance the expectation of life is gradually reduced up to one hundred and ten years, which is considered the extreme limit of age where it then becomes naught.

The animal body is in reality a vehicle for production; and after the life of the parent has become renewed in the offspring the body remains as a cast off envelope whose future is death. Were the frame of man not the complicated machine, it is known to be, death might come as a simple and gradual dissolution; being the last stage of loss of fundamental powers. As it is however death is always more or less violent. The machine comes to an end by reason of the disorder caused by the breaking down of some of its parts. Life ceases not because the powers of the whole body slacken and are lost, but because a weakness in one or other part of the machinery throws its whole working out of gear.

The central factor of life is the circulation of the blood, but the blood is not only useless but injurious unless it be properly oxygenated; and it is well known that in the higher animals the oxygenation of the blood can only be properly effected by reason of a breathing mechanism presided over by a su-

preme nervous center. Thus the life of a complex animal is, when reduced to a simple form, composed of three factors; the maintenance of circulation, the access of the air to the hemoglobin of the blood and the functional activity of the respiratory center. The arrest of either one of these functions proves fatal. It has been put in this way; that death takes place by the heart or by the lungs or by the brain. In reality, when the analysis is pushed further the central fact of death is the stoppage of the heart and the consequent arrest of the circulation. The tissues then all die. because they lose their internal medium—the blood. The failure of the heart may arise in itself on account of some failure in its nervous or muscular elements, or by reason of some mischief effecting its mechanical working; or it may be due to the want of oxygenation of the blood, which in turn may be caused by either a change in the blood itself, as in carbon dioxide poisoning, or by a failure in the mechanical conditions of respiration, or by cessation of the action of the respiratory centers. The failure of this center, and even that of the heart itself may be caused by nervous influences coming from the brain, or brought into operation by means of the central nervous system. It may on the other hand, be due to an imperfect state of the blood, and this in turn, may arise from the imperfect action of various secretory or other tissues.

The modes of death are in reality as numerous as are the possible modifications of the various factors of life; but they all end in the stoppage of the circulation, and the withdrawal from the tissues of their internal medium; hence we come to consider

the death of the body as marked by the cessation of the heart beat, a cessation from which no recovery is possible; and by this we are able to fix an exact time at which we say the body is dead.

CHAPTER XXI.

CARRIAGE OF THE BODY.

It has been said that good health depends on a proper carriage of the body inasmuch as a graceful carriage of the body is to be admired there can be no doubt that it is also conducive to good health. All intelligent persons of refined taste are ready to recognize and admire the elastic step and the majestic mien; yet they often fail to utilize this graceful endowment of nature. While it is not desirable that every one should, stand, sit or move in precisely the same manner, yet there are certain laws in regard to both posture and attitude which if strictly observed will be conducive to health of body and beauty of form. As the proper carriage of the body; especially of its vital organs is both healthful and graceful, it is necessary to learn the position that each of its members should take. To make the subject plain I will here quote from Mrs. J. W. Shoemaker, in her book on advanced elocution:

"The simplest position is to place the heels as closely together as the contour of the lower limbs will permit with the toes turned outward at an angle of about sixty degrees. The knees should be firm, the hips inward; the shoulders on a line with hips; held easily erect; with crown of head highest, chest raised; that is drawn up; thus liberating respiratory organs and abdominal viscera.

Allow weight of body to rest on balls of feet; standing thus, the line of gravity falls between the feet near the line of the toes. In this position see that no part of the body is unduly tensioned, and that all the sustaining muscles are in tone but pliant. This is not only a good position for a proper carriage, but it is a fundamental in the regular gymnastic exercises; and from this other and more complex positions are taken. The line of gravity however, must not be broken nor distorted in passing from one basic position to another; for if this happens the entire body is thrown out of the lines of both strength and grace. The lower limbs being controlled by special laws relating to the centre of gravity the line of gravity becomes a controlling influence in standing or in moving; and any variation of it mars the whole posture.

THE USUAL FAULTS IN STANDING.

Protruded chin, hollow or relaxed chest, protruded hips and abdomen, toes not at proper angles, both knees relaxed, arms hanging too far forward, looseness in all parts of the body, overnicety in all parts of the body, stiffness in all parts of the body.

WALKING.

Someone has said that all created things having the power of locomotion, except man, move in harmonious correspondence with the law of their nature. He alone hops and halts, trudges and strides, limps and ambles, and moves over the ground in a variety of other ways, all of which are in opposition to the rhythmus of his being. Much of this without doubt is due to the environment incident

to civilized life, more to the burdens imposed upon humanity by the dicta of fashion, and still more to carelessness and ease of self. The need to man of walking no one will question. It is an absolute necessity. To walk easily and well should be desired by every one on account of comfort and health; to walk elegantly should be coveted, for it is an art. When the right muscles are exercised and a proper pendulous action takes place, walking becomes a pleasure, because the exercise is made easy; because in itself it is exhilarating, and being mostly in the open air it is for both sexes a most healthful gymnastic.

FAULTS IN WALKING.

Walking with weight on heels, thus jarring spine, bobbing body up and down, rolling gait, pitching gait, strutting gait, loose or shuffling gait, hip action, stiff leg, unequal or irregular step.

Walking may be termed a series of arrested fallings, and has been uniquely defined as a steady forward movement of the torso through a regularly repeated action of the lower limbs. In other words, when there is an impulse to move the body forward the line of gravity immediately passes to one foot alone; the other foot is then loosened from the earth and the knee is relaxed; the muscle between the knee and ankle are relieved of tension, and the limb is thrust forward or pried over in a lever like way by the powerful muscles of the thigh, in which the principal action in walking takes place. The foot is next set upon the ground, the ball of the foot touching first, if there is no artificial heel to prevent. If there is the heel touches the ground

first, but it should be the inner part of the heel; that is, the part nearest the ball of the foot, and almost simultaneously with this should be the touch of the ball of the foot. In a similar manner the other foot is carried forward, the repeated movement resulting in a pendulous action of the body, induced by the forward shifting of the line of gravity. The body inclines slightly forward to accommodate itself to these changes, but must not be bent at the hip. The head should be held easily but not stiffly erect, and in line with the continuously advancing limbs. The hands unless supporting or carrying some object, should be down at the side and allowed to share the easy pendulous action of the body so as to aid rather than hinder the elasticity of the step. For comfort and grace of movement the length of the step should not extend beyond the length of one's own foot; that is the advancing foot should be carried forward until the heel is distant one foot length from the toe of the stationary one. Of course when pupils are moving in line this cannot be so precisely followed; then a regulation step must be adopted. In presenting the mechanical processes of good walking no attempt is made to correct individual peculiarities, but simply to render it possible for each person to move in accord with a law by which all are governed; nor is there any attempt to repress the mood which may be dominating the mind, and which often influences the gait. The perfection of walking lies in a movement so steady that one is reminded of the gliding of a boat over a still stream, or the skimming of a swallow through the air. All exercises either in walking or marching,

should be taken in gymnastic shoes, or in easy shoes of light weight, without heels so that the foot may have, as nearly as possible, the freedom of a natural step. For outdoor exercise the shoes should be stouter with broad soles and low flat heels.

SITTING.

To assume an easy and upright attitude or position in sitting the following directions should be observed:

Place one foot two or three inches back of the other; toes of both feet outward; the heel of the advanced foot toward the hollow of the backward one; then with line of gravity in backward limb with torso inclined forward and head slightly backward evenly sink to seat.

RISING.

In preparing to rise place the feet in position similar to that in preparing to sit, with weight in back limb, and with a slight inclination of torso and head.

BOWING.

Bowing is the most common of all salutations and consists ordinarily of simply a slight inclination of the head; but if occasion demand it may be the deeper and more reverential; one of the bending the body at the hips. Whichever mode is used it should be executed evenly, avoiding a quick or hesitating jerk."

I here introduce some of the more prominent basic positions of the body, which I quote from the author above quoted.

1st. Standing on a narrow base with weight upon foot directly under the body, the other slightly advanced, toes outward at the usual angle, knee of forward limb slightly relaxed, torso easily erect; the indication is that of dignity, calmness, passivity, or repose.

2d. With similar bearing of torso and foot placed as in principle first, but with weight upon forward foot, and backward when slightly lifted at heel and knee a little relaxed, the indication is that of quiet interest, attention or intention.

3rd. With basic position same as in principle first but feet more separated in lengths, and with line of gravity in heel of backward foot, with torso somewhat relaxed in shoulders, the indication is that of meditation, abstraction or concentrated thought.

4th. With basic position same as in principle second, but feet more separated in the lengths unsupporting foot on toe, its heel turned inward toward heel of sustaining foot, thus giving greater length to the limb; chest strongly raised, the indication is that of active interest, desire, earnestness, eagerness, courage, boldness, enthusiasm or vehemence.

5th. With feet considerably separated, backward limb supporting, knees relaxed, and torso retracted, with shoulders down forward and chest correspondingly inward, the indication is that of fear, dread, anguish or terror.

6th. With feet considerably separated, weight

on backward limbs, but both limbs rigid, torso raised and tense, the indication is that of independence, resistance, defiance, scorn, contempt or derision.

7th. With heels closed, toes out at the usual angle, both limbs supporting, torso easily erect, the indication is that of respect, obedience or deference.

8th. With feet somewhat separated and nearly parallel, both limbs supporting, the indication is that of weakness, infancy, decrepitude, or old age.

9th. With feet close together and parallel, knees relaxed, chest and elbows inward, the indication is that of timidity or want of self assertion.

10th. With feet somewhat separated, toes pointing forward, or turned slightly inward, and torso distorted, the indication is that of boorishness or rusticity.

11th. With base broad, heels parallel, both limbs supporting, torso well drawn upward, the indication is that of familiarity, bravado or astonishment.

12th. With short cat like movement on balls of feet, torso inclined forward and slightly bent at hips, the indication is that of caution, secrecy or scrutiny.

13th. With frequent changes of balance from one foot to the other, the indication is that of anxiety, nervousness or embarrassment.

THE POSTURES OF THE HEAD.

1st. Head level between shoulders, inclined neither to right nor left nor up nor down, the indication is that of calmness, dignity or repose.

2d. Head toward object addressed or contemplated, the indication is that of interest, sympathy, confidence, admiration or love.

3rd. Head carried away from object addressed or contemplated, the indication is that of disdain, contempt, hautiness, suspicion or scorn.

4th. With head forward and chin upward, the indication is that of hope, desire, petition or worship.

5th. Head down, chin in, the indication is that of resignation, humility, reverence, meditation, modesty, abasement or shame.

6th. Head held erect, the indication is that of exultation, joy, courage or triumph.

7th. Head same as preceding, but carried a little further backward, pride, anger or defiance.

8th. The nod of the head forward is indicative of approval, affirmation, approbation, emphatic declaration.

9th. The shake of the head or rotation is indicitive of doubt, denial, nagation, exasperation or regret.

10th. Head inclined toward either shoulder is indicitive of weariness, languor or doubt.

11th. Head somewhat drooped is indicitive of sorrow, depression or discouragement.

12th. Head thrust forward, the indication is that of scrutiny or curiosity.

CHAPTER XXII.

INDICATIONS OF CHARACTER.

The facial expression; the eyes, complexion, color of the hair, conversation, mode of laughing, all form indications of character.

A good face is not necessarily a beautiful one; but is a face of honesty and candor, which is better seen than described can be learned only by observation.

The eyes indicate a great deal; they love, they hate, they envy, they wither.

Colors indicate qualities through all organic nature. Black indicates power, and generally accompanies the powerful or motive temperament. Of this the black animals and the black races furnish examples. Dark complexioned persons generally wield a powerful influence over those with whom they come in contact; especially the opposite sex. Black haired speakers carry their audiences with them as they please. This color is very appropriate to Politicians, Generals, and men in public business. The light complexioned races are much more progressive and refined than the dark, and also they are less sensual. Coarse black and coarse red hair, skin and whiskers indicate powerful animal passions, together with corresponding strength of character, while fine white and auburn hair indicates quick susceptibilities with

refinement and good taste. Fine dark or brown hair indicates the combination of fine susseptibilities with great strength of character, while auburn hair and a florid countenance denotes the highest order of sentiment and intensitive of feeling alone with corresponding purity of character, combined with the highest capacities for enjoying and suffering.

Intermediate colors and textures accompany intermediate characters. Curly hair and beard indicate an excitable and variable disposition with diversity of character.

A dark haired female is able, if disposed, to control a lover or husband as if by magic. He will be, as it were, spell-bound in her company, and feel that he has to do as she says. If she is good her influence in her family and circle will be supreme and most beneficial, but if she is selfish she will by persuasion or force, bring all hands under her thumb. If she espouses good ends none can execute them better; if bad, none is more desperate.

Black-haired bachelors usually play havoc with female hearts; breaking them right and left. A great amount of gender usually goes along with this complexion. It generally accompanies the powerful or prominent organism. Red hair and impulsiveness generally accompany each other. Heartiness of soul, warmth and emotionality generally go with auburn hair and blue eyes.

A brunette wife will be the more independent and efficient. A blonde more loving, clinging, tender, complying and dependent. The latter is the easier molded to your taste; the former will

mould you to hers. If you desire refinement, taste, exquisiteness, gushing emotions, sweetness and purity, choose the blonde. If efficiency, energy and force, choose the brunette.

Pale black indicates more burning intensity, more fervor of desire, more power to do, in short, more desperation than any other. It signifies the white heat of all the mental operations along with great endurance.

Florid complexions and light hair usually go together. Dark-red, verging toward brown hair is a very excellent color. It indicates power with purity, strength with goodness, and sense with virtue.

Flaxen hair and a light complexion verging toward pallor indicates quickness of perception and action, warm affections, a bright clear mind, good pure motives, taste, and a desirable character throughout. It is rarely accompanied with coarseness, either organic or passional.

Grey eyes signify power in all the functions; strong and hearty passions, and vigorous intellect.

The present state of the various functions are also indicated by the temporary color; as the variable colors of the cheek for the time being indicate the existing state of the health, so they equally indicate mental health and disease.

Existing color proclaims existing organic and mental conditions. When the system is in a perfectly healthy state, the whole face will be suffused with the glow of health and beauty, and have a red, but never an inflamed aspect; yet any permanent health injury which prostrates the bodily energies will derange this beautiful complexion into a dull-

ness of countenance, which indicates that but little blood comes to the surface or flows to the head, with a corresponding stagnation of the physical and mental powers. Yet this dullness frequently gives way to a firey redness, which is not that of health, but the redness of inflammation or false excitement.

Dark or livid red faces, so far from indicating the most health often signify disease, and also animal and sensual characters.

Gross sensualists of a depraved character, often have a fiery red countenance. Stand aloof from them for their passions are all on fire ready to ignite and explode on provocations so slight that a truly healthy mind would scarcely notice it.

When the faculty of force is large, with bright scarlet red cheeks, it manifests itself in self-defense, energy and virtuous indignation. While with this faculty equally large, with a dark brown red face the red diffused all over the face instead of confined to the cheeks, and of a dark, bloody, muddy hue, it signifies a perverted depraved action in wrath, violent fits of temper, vindictiveness, spite and malice.

The faculty of ambition large, with bright red cheeks loves praise, but has no envy or jealousy. It likes to be praised but is also willing for rivals to be praised. While this same amount of the faculty of ambition, with a livid red face signifies its diseased, distorted, perverted action, which creates envy, rivalry and jealousy.

Love furnishes our best illustration of this point. Pure, elevating, sanctifying love, accompanies bright scarlet red in the cheeks, which vanishes

off into pink and then into a pure lilly white; while a dark brown, dull, muddy red,—not exactly red but a dingy brownish red, signifies an animalized state of amativeness and lust, along with sexual exhaustion. A good complexion then is something more than skin deep, and so is a poor one.

Who does not know that the state of the health is largely indicated by the complexion? One may justly be proud of a good complexion and ashamed of a poor one; while all should try to keep theirs good by observing the laws of health.

Well proportioned temperaments create harmonious features, and symmetrical well balanced minds, whereas some of those whose features stand right out, and others fall in, have uneven ill-balanced characters; so that homely, disjointed exteriors indicate corresponding interiors; while evenly balanced and exquisitely well formed men and women have well balanced minds. It follows therefore, that woman more beautiful than man, has finer feelings and greater perfection of character, although she is less powerful; and the more beautifully formed a given woman is, the more exquisite and perfect is her mentality.

Nature never deceives by clothing that in a beautiful attractive exterior which is intrinsically bad. Truly enough, some of the handsomest women sometimes make the greatest scolds, and develop bad characters just as the sweetest things when sour becomes correspondingly sour; and the finest things when perverted become the worst. Those naturally beautiful and exquisitely organized, when perverted become proportionately bad; and those naturally ugly formed are naturally bad disposi-

tioned. Homely persons however, are often good tempered benevolent and talented.

The expressions of the eye convey precise ideas of the existing states of the mind and body. As long as the constitution remains unimpaired the eye is clear and bright but becomes languid and dull in proportion, as the brain has been enfeebled.

Wild, demented persons have a half crazed expression of the eye, while calmness, intelligence, purity, sweetness, love, sensuality, anger, and all the other mental states express themselves quite as distinctly by the eye as by the voice or any other mode of expression.

Intonations express character. Whatever makes a noise, from the roar of the sea, whirlwind, or, through all forms of animal life, from the roar of the lion to the gentle voice of woman, creates a sound which agrees perfectly with its maker's character, while the rough and powerful bellow of the bull, the fierce yell of the tiger, the coarse mourn of the hyena, the sweet warblings of birds, all correspond perfectly with their respective characteristics, and this law holds equally true of men, therefore human intonations are as superior to brute as human character exceeds animal. Accordingly the peculiarities of all human beings are expressed in their voices and modes of speaking. Coarse grain and powerful animal organizations, have a coarse, harsh and grating voice; while in exact proportion, as persons become refined and elevated mentally, will their tones of voice become correspondingly refined and perfected. We little realize how much character we infer from this source. Barbarous races use the guttural sounds

more than the civilized; thus Indians talk more down their throats than white men.

Those whose voices which are clear and distinct have clear minds, while those who only half form their words or are heard indistinctly are mentally obtuse. Those who have sharp, shrill intonations have correspondingly intense feelings and equal sharpness both of anger and kindness; whereas those with smooth or sweet voices have corresponding evenness and goodness of character. These same persons not unfrequently combine both sharpness and softness of voice, and such always combine them in their character. There are also intellectual, moral, animal, selfish, mirthful, devout, loving, and many other intonations, each with corresponding peculiarities of character. In short, every individual is compelled by every word uttered, to manifest something of the true character. The underlying principle here involved, and means by which these tones proclaim the character, is this: Every faculty pervades the entire character of its possessor, and impresses itself it its relative degree of power upon everything he says, does and is; thus, kindness, devotion, firmness, taste, reason, the affections, and especially love, and every other faculty manifests their relative power and weakness in every tone and in every act.

One has only to know each faculty by its characteristic signs to be able to determine from mere trifles and everything one says and does, just how much of this faculty and how little of that, each person possesses. Whoever meets you with a long low bow thinks more of you than he does of himself; but whoever greets you

with a short quick bow, with a half bow forward, and a bow and a half backward, thinks one of you and two of himself. Very firm men stand straight up and down, inclining not a hair's breadth forward nor backward; neither to the right nor the left; hence the expression, "he is an up and down man."

Every primary element in the mind of man, of which each faculty is a representive, expresses itself in everything everyone says and does, in proportion as it is developed. That is, each faculty declares itself and its relative force in everything, each appertains to in everything in nature. To whatever he says and does, down to every tone of the voice, every look of the eye, every motion of the body, every sentence uttered, thought conceived, feeling felt, and mental action whatsoever. Those who look like animals of one kind or another, also resemble them in character. That is, some have both the lion and bull-dog, or eagle or squirrel expression of the face, and likewise have traits of character.

Tiger men are always spare, muscular, full over the eyes, large mouth, and eyes slanting downward from their outer to inner angles, and human beings thus characterized are fierce, domineering, revengeful, most enterprising, not over-humane, a terror to enemies and conspicuous wherever they go. Horses, oxen, doves, sheep and foxes, also have their men and women cousins with their accompanying characters. These resemblances to animals are more easily observed than described, but the forms of the mouth, nose and chin are the best guides for observation.

The walk is peculiarly expressive of the charac-

ter, as is even every other motion. When the life principle is slack and its manifestations are lax, the walk is dragging, shuffling and loose jointed. A walk and cast of motion full of snap and vim, signify character full of energy and power, while the shiftless, inert person has a shiftless, lagging dragging walk and mode of movement. An abundance of life magnetism keeps every muscle tensioned, and renders the walk light and springy, An angular cast of motion full of short, sharp turns signifies a short, curt, snappy, uneven, impatient irritable cast of character; whereas an even, gentle, waving, spherical cast of character, denotes a harmonious, consistent, gentle, sweet and regular sameness of character, corresponding to the walk. A shuffling walk which often hits the heels is a very poor sign, as is stubbing toes. Those who do or walk thus will never make anything of any account; while those who pick their feet up clear from the ground, handle them nimbly, and walk with a light limber-jointed motion will carry these characteristics in and throughout all they do. Fast walkers do everything else fast, and slow walkers think, feel and live slowly; in fact are slow moulded generally. A genteel, pretty, tasty walk grows out of a like spirit nature, which executes everything else likewise; while a slouchy, ugly and ungainly, unslightly walk comes from a slouching spirit fountain.

It is well to cultivate the acquaintances of those you admire the walk of, but shun those whose walk is repellent or has any unpleasant feature about it. A dainty, affected, try-to-move-pretty walk signifies a make-believe, artificial life; one thing in-

side, another out. Such persons are not genuine heart in hand creatures, but insincere and full of false pretenses. Powerful and powerless walks signify the former a powerful character and the latter a powerless character, stopped by straws and mindful of trifles as well as swayed by them. Other walks and corresponding traits of character will no doubt be suggested to the reader by these examples.

The laugh is peculiarly expressive of the character. A loud laugh signifies power; a soft one softness. A coarse, gross, hoarse laugh, a coarse, low bred vulgar person. A hearty side-shaking laugh, a whole soul energetic character. A muffled laugh, a self suppression and control. A spontaneous outbursting laugh, spontaneity and sincerity of character. Short giggles with little force, but rapid; a rapid way of doing little things without much force of character, while loud, hearty giggles signify power and speed throughout the character.

Refinement, purity, power, firmness, force, goodness, affection, temper, health and the want of either, as well as their amount, and in fact all other states of all other elements speak out in the voice in general, and laugh in particular, with a distinctness better understood by being observed than can be described with words.

Many kindred signs indicate the general and special traits of character; but each reader will have to observe for himself as to what particular laughs, walks, and other signs indicate in any particular instance.

PROPORTION A LAW OF THE MENTAL FACULTIES.

The mind is governed by a law of proportionate action among its faculties. All excesses and all defects tend to weaken character; as lemonade to be right good must contain about as much sweet as sour, and sour as sweet, so perfection of character requires an equal proportion among all the faculties. An excess of the propensities over the moral faculties predisposes to passional excesses, which is neither favorable to happiness nor virtue, because unguided and unrestrained by the higher faculties; and in that proportion puts us on a level with the beasts that perish, or when there is a great predominance of the upper faculties over the lower, makes one in that proportion too good for his own good. Men naturally make game of these very good, innocent, harmless people, whose goodness degenerates into softness, just as sheep are preyed upon by fierce animals. All should be executive in proportion as they are good, and the better, the more forcible they are lest their force becomes aggression or else perverted to wrong uses. Avoid both being so good as to be good for nothing, and so selfish as to overrule goodness; but be selfish enough to provide well for personal wants, yet moral enough not to allow the selfish faculties to wrong others. Great men have great faults has passed into a proverb because they have some powerful faculties with others very weak or bad. One with predominent perceptives and weak reason can collect and retain knowledge, excel in scholarship, and talk easily, yet is superficial and unable to ascend from facts to first causes, and lacks judg-

ment and contrivance; but those in whom the perceptives are deficient and with strong reasoning powers, are theoretical but have a wretched memory, and are unable to command their knowledge or bring their superior reasoning powers into practical use, are merely abstract and always impracticable; and though they know how to reason, their command of facts are too limited to give them the requisite premises to form correct conclusions-whereas, when both are equally developed the perceptives furnish abundant material for the reflectives to work up sound conclusions and the two together give general talents, and constitute a well balanced, philosophical mind, creating sound common sense, correct judgment, and enlarged views in place of those warped conclusions, fallacious opinions and abortive efforts, consequent on the predominance of either over the other. Large reasoning powers with small expression gives plenty of excellent ideas which are spoiled by a scarcity of words; while large expression with weak reasoning powers talks a great deal and says very little, and gives plenty of words along with few and poor ideas, while their equality gives as many words as ideas and as many ideas as words. A woman with small love for her husband and large affection for her children, prizes and dotes on her children, yet cares little for her husband; while one with large love for her husband and small affection for her children, cares for and dotes on her husband, yet neglects her children; whereas, one with large love for both worships, does for, and enjoys both. It is plain that the last named would be far the happiest in her family and her family in her. Exces-

sive acquisition with little caution speculates wildly, contracts debts beyond means of payment, and loses all, and with deficient reasoning powers devises poor ways and means of making money, always grasping one straw after another only to sink the deeper; while these faculties equally developed, ove money but not inordinately, lay out feasible plans, yet pay all dues and enjoy business and money, thus gratifying both these faculties and all the others. Excess of ambition over talents makes a laughing stock of talent over self-trusts, a bashful genius, who would be better off with more brass, even 'though with less genius. How much better equal dignity and worth over worth without dignity or dignity without worth.

Those who have large dignity, firmness and force, with moderate ambition, conscience and intellect, are proud, hauty, imperative, domineering, overbearing and selfish, yet have too little intellect and moral worth to support their authorative pretentions; whereas the equal development of all the faculties gives superior talents and moral elevation, along with that self-respect which supports the finished gentleman to mental and moral greatness, thereby both being and making happy. Excessive firmness with deficient caution makes one decide without proper reflection, and to adhere stubbornly to previous decisions, while excessive caution with deficient firmness renders one afraid to decide either way, vacilating with false fears and afraid of shadows, whereas those with these organs equal, decide carefully, yet hold out persistently; first making sure that they are right and then going straight ahead, which is always the best.

CHAPTER XXIII.

DOES CULTURE STRENGTHEN THE FACULTIES?

Yes, to a very decided degree. Many facts without any opposing, prove that the more a faculty is exercised the more strongly and actively it becomes, and the less it is exercised the weaker. We are not compelled to carry all our excesses and faults through life, though the tendencies of all the strong faculties in one is to become stronger and the weak ones still weaker. The larger the faculty the greater the pleasure taken in its exercise, and therefore the more easy and continual is its action which naturally reincreases its size and activity; while the weaker the faculty is the less pleasure is taken in its action, and therefore the less it is exercised, so that it becomes diminished by inaction; yet where the will power is sufficient this tendency can be counteracted, and the power of any required faculty be increased or diminished at pleasure. Any law that governs a part of any given class of functions of necessity governs them all; then since culture so wonderfully increases the physical activities, why not equally the mental? The old maxim that practice makes perfect is especially true of the exercise of all our feelings, passions, tastes, moral sentiments, intellectual faculties, mind and body. To give some illustrations, the more the gallant courts female society the more he loves it, but the less the constitutional bachelor

visits the ladies the less he cares to see them. A fond husband loves his family the more he is with them at home; while being much from home and family weans any and all from them. War has a powerful effect to increase martial courage. Facing danger always emboldens. The more money the miser makes the more he loves it, while the want of the spendthrift increases his expenditures. Children or horses, when frightened, become much more timid after than before. The more we are praised or indulge in fashionable displays the more we are carried away with them.

The more we use tools the more skillful we become in their use; whereas, we grow awkward by their disuse. The more one acts the better is his acting, and the less, the poorer. The more we read, study, think or speak, the more natural and skillful we do either, and the reverse. The more we sing or play the more expert singers or players we thereby become. Any kind of memory is stregthened by culture. It you really must have an errand done give it to one who does a hundred errands a day. If you give it to one who rarely does an errand it will most likely be forgotten. The difference observed between the talents of great men and common ones is no doubt partly consequent on the degrees of culture that each has of his natural gifts. Nature makes some of it of course but it requires cultivation to perfect it. Natural gifts, be they ever so great, accomplish very little unless they are disciplined; while moderate talents carefully cultivated work well.

Every intellectual faculty, every moral virtue, and every animal propensity can be strengthened

by cultivation, often beyond the highest expectations.

LOVE.

Love has been defined as a tender emotion existing between the sexes; and as it exerts such an influence, either for making or unmaking of many person's characters; also for making them happy or unhappy, I will here quote a description of love, its cultivation and restraint, from Prof. O. S. Fowler's phrenology. The terms Large, Full, Average, Moderate and Small, relate to the faculties of susceptibilities to love:

"It creates in each sex, admiration and love of the other. Renders woman winning, persuasive, urbane affectionate, loving and lovely, and develops all the feminine charms and graces; makes man noble in feeling and bearing, elevated in aspiration, galant, tender and bland in manner, affectionate toward woman, highly susceptible to female charms, and clothes him with that dignity, power and persuasiveness which characterize the male.

Large—Are admirably sexed, or a well nigh perfect male or female, literally idolize the opposite sex, love almost to insanity; treat them with the utmost consideration, cherish for them the most exhaulted feeling of regard and esteem as if they were superior beings; have the instinct and true spirit and tone of the male or female in a pre-eminent degree, must love and be beloved, are sure to elicit a return of love, because intuitively winning, attractive and attracted; almost worship parents, brothers and sisters of the opposite sex; with organic quality large and the other social organs large have the conjugal intuition in a pre-eminent degree, assimi-

late and conform to those loved and become perfectly united, and with constancy large manifest the most clinging fondness and utmost devotion, and are made or unmade for life by the state of the affections, have many friends and admirers among the other sex; love young and most intensely, and are powerfully influenced by the love element for good or evil, according as it is well or ill-placed, with friendship and constancy, large will mingle pure friendship with devoted love, cannot flourish alone but most have a matrimonial mate with whom to become perfectly identified, and whom to invest with almost superhuman perfection, with large beauty and a mental temperament added will experience a fervor and intensitive of love, amounting almost to ecstasy or romance, can marry those only who combine refinement of manners with correspondingly strong attachments; with parental love and kindness also large are eminently qualified to enjoy the domestic relations and be happy in home as well as to render home happy, with inhabitiveness also large will set a high value on a house and place, long to return home when absent, and consider family and children the greatest of life's treasures; with large conscience added will keep the marriage relations inviolate, and regard unfaithfulness as the greatest of sins, with force large will defend the object of love with great spirit and resent powerfully any indignity offered them; with appetite large will enjoy eating with loved one and family dearly; with ambition large cannot endure to be blamed by those beloved; with caution and secretion large will express love guardedly and much less than is experienced, but with secretion

small will show in every look and action the full unveiled love of the soul; with firmness and dignitd and constancy large will sustain interrupted love with fortitude yet suffer much damage of mind and health therefrom, but with dignity; moderate will feel crushed and broken down by disappointment; with the moral faculties predominent can love those o ly whose moral tone is pure and elevating; with predominent beauty and only average intellectual faculties will prefer those who are showy and gay to those who are sensible yet less beautiful; with mirth, time and tune will love dancing, lively company, etc.

Full—Possess quite strong susceptibilities of love for a congenial spirit, are capable of much purity, intensity and cordiality of love if its object is about right, with friendship and kindness large will be kind and affectionate in the family; with a highly susceptible temperament will experience great intensity of love, and evince a good degree of masculine or feminine excellence. Average are capable of fair conjugal attachments and calculated to feel and exhibit a good degree of love provided it is properly placed and fully called out, but not otherwise experience a greater or less degree of love in proportion to its activity, as a man quite attached to mother, daughters and sisters and fond of female society and endowed with a fair share of the masculine element, yet not remarkable for its perfection; as a woman quite winning and attractive, yet not particularly susceptible to love; as a daughter fond of father and brothers and desirous of society of men, yet not especially so, and capable of a fair share of conjugal devotedness under favorable

circumstances, combined with an ardent temperament and large friendship and beauty have a pure and platonic cast of love, yet cannot assimilate with a coarse temperament or a dissimilar phrenology, are refinded and faithful, yet have more friendship than passion; can love those only who are just to the liking; with caution and secretion large will express less love than is felt, and that equivocally and by peace meal, nor then until the loved one is fully committed; with caution, ambition and worship large and dignity small are diffident in promiscuous society, yet enjoy the company of a select few of the opposite sex.

Moderate—Are rather deficient though not palpably so in the love element, and averse to the other sex, love their mental excellencies more than personal charms show little desire to caress or be caressed, and find it difficult to sympathize with a conjugal partner unless the natural harmony between both is well nigh perfect; care less for marriage, and can live unmarried without inconvenience; with constancy large can love but once and should marry the first love, because the love principle will not be sufficiently strong to overcome the difficulties incident to its transfer, or the want of congeniality, and find more pleasure in other things than in matrimonial relations; with an excitable temperament will experience greater warmth and ardor than depth or uniformity of love; with beauty and organic quality large are fastidious and overmodest, and terribly shocked by illusions to love; pronounce love a silly farce, and only fit for cracked-brain poets; with ambition large will soon become alienated by rebukes and fault finding; with friend-

ship and the moral and intellectual faculties large can become strongly attached to those who are highly moral and intellectual, yet experience no affinity for any other, and to be happy in marriage must base it in the higher faculties.

Small—Dislike the opposite sex and distrust and refuse to assimilate with them; feel little sexual love or desire to marry; are cold, coy, distant and reserved toward the other sex; experience but little of the purifying elevating influence of love, and should not marry because incapable of appreciating its relations and making a companion happy and are passively continent.

TO CULTIVATE: Mingle much in the society of the other sex; observe and appreciate their excellencies and overlook their faults; be as gallant, gentlemanly or ladylike, inviting, prepossessing, lively and entertaining in their society as you know how to be, and always on the alert to please them; say as many complimentary and pretty and as few disagreeable things as possible; that is, try to cultivate and play the agreeable; if not married, contemplate its advantages and pleasures and be preparing to enjoy them; if married get up a second and improved edition of courtship; re-amour both yourself and conjugal partner by becoming just as courteous, loving and lovely as possible; luxuriate in the company and conversation of those well sexed, and imbibe their inspiriting influence; be less fastidious and more free and communicative; establish a warm cordial intimacy and friendship for them, and feast yourself on their masculine or feminine excellency; if not married, marry and cultivate the feelings as well as live the life of

a true and hearty sexuality; to restrain, simply direct this love element more to the mental and less to the personal qualities of the other sex; admire and love them more for their minds than bodies, and more for their moral purity and conversational powers, than as instruments of passion; seek the society of the virtuous and good but avoid that of the vulgar; should mingle in their society to derive moral elevation and inspiration therefrom, and be made better not to feed the fires of passion and yield to their moulding influences for good; should be content to commune with their spirits; should sanctify and elevate the cast and tone of love and banish its baser forms; especially should lead a right physiological life; avoid tea and meats and abstain wholly from coffee, tobacco and all forms and degrees of alcoholic drinks; wines and beer included; exercise much in the open air; abstain wholly from carnal indulgence; work off your vital force on other functions as a relief of this, bath daily, eat sparingly, study and commune with nature; cultivate the pure intellectual and moral as the best means of rising above the passional, and put yourself on a high human plain throughout; remember that you require its purification, elevation and right direction rather than restraint because it is more perverted than excessive, and that the inflamed state of the body irritates and perverts this passion; of which a cooling regimen is a specific antidote. Love, how inexpressively sacred. Is Divine worship any more so? What other human emotion penetrates quite as deeply into the very rootlets and soul of human existence as does this tender sentiment? For what does a man

launch out as freely as to the female he loves? She generally gets more of his time, money, feelings and soul than his Saviour. Even appetite gets but moiety as much of either. All human experience concur in pronouncing this man's one grand master passion; say all ye who have ever loved, and who matured but has; what woman's sentiment ever struck away down in the very rootlets of your being as did this Divine sentiment?"

CHAPTER XXIV.

FRIENDSHIP.

Aristotle the philosopher divided friendship into three classes:

First, friendship for the useful, and second friendship for the pleasant, and third friendship between the good. In case of friendship for the useful the friendship ceases with the motive as between tradesman and customer; in the case of friendship for the pleasant there is no motive except passive enjoyment; and in the case of friendship between the good it is based on merit and affection altogether, and may exist in the distance or between persons that are separated.

To illustrate the various strengths of friendship I will introduce a passage here from Professor Fowler's phrenology. The terms Large, Average and Small refer to the faculties of friendship:

"Description, cultivation and restraint of friendship.

Large—Love friends with the utmost tenderness and intensity and will sacrifice almost anything for their sake, readily form friendships and attract friendly regards in return, must have society of some kind, with force and destruction full, defend friends with spirit and resent and retaliate their njuries, with dignity moderate, take character from associates, with acquisition moderate, allow riends the free use of purse, but with acquisition

large will do more than give, with kindness and ambition moderate and acquisition only full, will spend money freely for social gratification, with dignity and force large must be first or nothing, but with a only average and large ambition, kindness, conscience, beauty, and reasoning organs, will have many friends and but few enemies; be amiable and universally beloved, with large eventuality will remember with vivid emotions bygone scenes of social cheer and friendly converse; with large reasoning organs, will give good advice to friends and lay excellent plans for them, with smaller secretion and larger moral organs, will not believe ill of them, and dread the interruption of friendship as the greatest of calamities; willingly make any sacrifice required by friendship, and evince a perpetual flow of that commingling of soul and desire to become one with others which this faculty inspires; with appetite large love the social banquet and set the best before friends; with ambition large, set the world by their commendation but are terribly cut by their rebukes; with the moral faculties large, seek the society of the moral and elevated and can enjoy the friendship of no others. With the intellectual large, seek the society of the intelligent, with expression large and secrecy small, talk freely in company; and with mirth and beauty also large, are full of fun, and give a lively jocose turn to conversation, yet are elevated and refined. With dignity large, lead off in company and give tone and character to others; but with it small, receive character from friends; and with imitation large are liable to copy their faults as well as virtues. With caution, secretion and ambition large

are apt to be jealous of regards bestowed upon others and exclusive in the choice of friends, having a few select rather than many commonplace.

With large causality and comparison, love philosophical conversation, literary societies etc., and are every way sociable and companionable.

Full—Make a sociable warm-hearted friend who will sacrifice much on the alter of friendship, yet offer it up on the alter of stronger passions. With kindness large, will cheerfully aid friends, and have a few warm ones, yet only few; but perhaps many speaking acquaintances, and with the higher faculties generally large will be a true good friend; yet by no means enthusiastic. The combinations under friendship large apply to it when full, allowance being made for its diminished power.

Average—Are capable of tolerably strong friends, yet their character is determined by the larger faculties; enjoy present friends, yet sustain their absence. With large acquisition, place business before friends, and sacrifice them whenever they conflict with money making. With kindness large, are more sympathetic than affectionate, and relish friends, yet sacrifice no great for their sake. With love large, love the person of the other sex more than their minds, and experience less conjugal than animal passion; with ambition large, break friendship when ridiculed or rebuked; and with secretion large and conscience only average, cannot be trusted as friends.

Moderate—Love society somewhat, and form a few but only few attachments, and these only partial; may have many speaking acquaintances, but few intimate friends. With large force and destruc-

tion, are easily offended with friends, and seldom retain them long. With large kindness, will bestow services and with moderate acquisition, money more readily than affection; but with the selfish faculties strong, take care of self first and make friendship subservient to interest. With large or very large force, destruction, dignity, ambition and acquisition, will serve self first and friends afterwards, and form attachments yet break them when they conflict with the stronger faculties. With large secretion and moderate conscience, will be double-faced and profess more friendship than possess.

Small—Think and care little for friends; dislike copartnership, and are cold hearted, unsocial and selfish; take little delight in company but prefer to be alone; have few friends and with large selfish faculties, many enemies, and manifest too little to exert a perceptible influence upon character."

It has been said that the cultivation of friendship is as important as the blessings are numerous and great that it confers. The friendless, whether they be so by poverty or wealth, are indeed pitiable; while a congenial spirit is a perpetual feast in itself and a source of comfort in trouble.

By a natural law of our mind the actions of the faculties in one awakens them in all other beholders; while stupidity leaves them inactive, and mixing up with others arouses all our moral and intellectual faculties to that sustained activity which develops them for future efforts. Nothing is as fatal to the faculties of men as inertia which often comes of loneliness, nor is there anything else so beneficial or happyfying as that healthy mental

stimulus provoked by the association of others. Without this contact with men, ambition, imitation, taste, worship, kindness, and expression must starve out or rust to death.

Neighbors should be vastly more social than they are; they should always be exchanging pleasant remarks and joining in social gatherings and meetings of various kinds, extending hospitalities, visits etc. Families should be still more familiar and cosey, and vanish all rivalries and animosities. We often hear it said, "business before friends," but it should rather be "business with friends," and all business firms should make friends of each other first as their best means of success. Many men enjoy but a mere fraction of the pleasures and profits that may be derived from this faculty.

When a young man secures the friendship of a gentleman he will always be on the alert to help him out in time of need; while every enemy will treasure up something ill until some suitable opportunity presents itself, and then bestow his grudge. The young gentleman and the young lady also, should be very judicious in the selection of their friends, and form the very best associations possible; yet they should not prove themselves hostile to those not just to their liking; they should, however, never be unduly led by them.

In order to cultivate this faculty one should go more into society, associate more freely with those around, be less exclusive and distant, and strive to be as companionable and familiar as he well knows how.

CHAPTER XXV.

CONVERSATION AND GOOD MANNERS.

Conversation and good manners, next to intellectual and moral attainments, holds one of the highest places that can be obtained or that human beings are endowed with. Our mental capacity is regarded as one of the most exalted departments of nature; and this faculty, that of manners and conversation, is our main medium of manifestation; therefore, anything that improves our communicating power must be regarded as of the highest importance. The mind itself crowns our nature with the second highest ornament and promotes personal and general enjoyment beyond computation.

Lord Chesterfield has well said that "good conversational powers are an open and universal letter of recommendation." They often charm those who are naturally averse to us. They embody the most perfect of all means of communicating instruction; conveying ideas, feelings, and all the operations of the mind. He can persuade as he will who weilds them, and thus become the highest instrumentality of success. They give their possessor command over mind. It has been considered a great gift to be able to mould or fashion the marble block into the image of humanity, but to mould character and control opinion and determine conduct is the highest power bestowed upon

men, because instrumental of the greatest amount of happiness.

In order to illustrate the powers and accomplishments of the higher order of attainments by speech I will here quote from Professor Fowler's phrenology in relation to it:

"Eloquence man's second glorious gift. Behold Demosthenes rousing electrified throngs till they seize their arms and wildly exclaim, 'let us march against Philip, let us conquer or die.' Behold a Cicero weilding the most powerful sceptre on earth, by his flowing and effective eloquence. Behold a Burke speaking not mainly to the few thousand crowded around him, but to a mighty Empire; to the entire civilized world for ages after his voice was hushed in death. Behold a Patrick Henry, enchanting and arousing his fellow citizens at home and his compatriots in Congress till he prefaces and ushers in that immortal declaration of human freedom, which is now undermining every throne and dinasty on earth, and will soon enfranchise the race itself, and give to oppressed humanity forever the glorious birthright of liberty, civil, ecclesiastical and intellectual. Behold O'Connell wherever he opened his mouth, a nation at his feet hung on his words. He said forbear, and they forbore, 'though lashed up to desperation and frenzy by oppression and starvation. If he had said fight, nations would have rushed to mortal combat. Give me eloquence in the forum or on paper, and I will mould mind, fashion, motive and develop soul. Will wean erring humanity from its fooleries and its errors. Make sinful miserable men, virtuous and happy. Reform and

adorn my country till it becomes the model nation of the world, and even make earth another Eden. Only give me eloquence, I care not what you take; take this boon, I care little for what is left."

Can delivery be improved? Yes, to an astonishing extent. Undoubtedly many, many readers and conversationalists with very ordinary natural gifts, might by cultivating their natural gifts and graces, equal or surpass many of our good speakers, both in conversation and delivery. Conversation furnishes the very best opportunity for cultivating and improving style; for while others are talking we can both listen and arrange our own ideas and language. Those who cannot be really eloquent in conversation cannot be eloquent anywhere. It requires neither interest nor excitement, because both are brought to the highest pitch of healthy action. There is also something in the very nature of this conversational interchange of ideas and feelings in answering and replying and answering again is in every way suited to elicit mental action and beauty of sentiment, and also to facilitate this eloquent, charming, forcible expression. In public speaking the sentences must be made too rapidly to allow of that strength of thought and arrangement of ideas and sentences, or that beauty of diction which is fully provided for in conversation; but these faculties are far too little improved. To be a good converser one must exercise care and judgment in casting his sentences. One may talk a lifetime without any effort to improve, and make no progress in conversation.

Frequent and protracted talks with men of wide culture are highly useful. It would appear that

there are many men who do not even know how or attempt to improve conversation. It is like many other exercises, less tedious after one becomes versed in it than in the exercise of improving. It has been said that only few men talk ideas and fewer still, take pains to express them well; but when we do meet those highly gifted in conversation hours become short like minutes to us, so much more do we enjoy their society than in ordinary life. To excel in conversation, one should exercise patience, and observe the law of good breeding of waiting until others finish before he begins.

By the careful correction of faults in conversation, improvement is certain to follow, and will enable us to diminish existing blemishes and add many strokes of beauty and impressiveness, and often enable us to literally charm our hearers by the perfection of our diction and composition, and contribute more to the happiness of ourselves and fellowmen than if we possessed great fortunes.

To communicate well is more important than the quantity of words used. It is always more essential to express ourselves elegantly and forcibly than to rattle away without sense or beauty. Whenever a few appropriate words will express more than many, they accomplish more and are preferable. In general the fewer words, the better; provided however they fully convey the precise meaning intended.

Perspicuity is the first and highest excellence of the converser. We speak and write solely to be understood, and the better you enable a listener and reader fully to comprehend your precise ideas the more perfect your communicating powers are;

so one to converse well should first seek perspicuity, and thus make his mental operations perfectly clear to the listeners or readers, so that they can neither mistake nor doubt. Impressiveness is another very important quality of conversation. We speak or write solely to impress our own mental operations on other minds; then we should so express them as to render the transfer entire and complete. In the accomplishment of these ends more perhaps depends on the general arrangement of sentences than on the words used. There is a right and a wrong arrangement for every division, clause and word of every discourse, as much as for the hand, eye, or any part of the body. The difference in the effect produced by transposing clauses and words is indeed great. It is not hard for any ordinary scholar to perceive this difference. In order for self-improvement one should frame sentences and then alter and modify in order to perfect them. This is a most excellent discipline as well as a promotor of forcible and correct conversation.

Ornament is a desirable part of conversation Nature adorns all her works, and indeed is one grand field of beauty. All the vegetable world with its charming flowers, the human form and face, all creation is adorned with beauty; yet what is more perfectly enchanting than elevated sentiments and sublime ideas elegantly expressed? We may gaze on a beautiful face, the highest order of beauty of form, but let us behold beauty of soul as manifested by words. What else embodies more of the truly divine? Has nature provided so amply for adorning physical works and failed in further

ornamenting her highest work of all? Has she stamped so high a grade of beauty on the human form and face and yet neglected to adorn its principal avenue of manifestation? No, such an ornament has been created. We speak properly of flowery language and an ornate style. Give me an elegant style; I care nothing for gaudy attire or splendid equipage, and yet there are many who spend hours daily in putting on outward adornments, often almost amounting to deformities and tolerated only on account of being fashionable, without any effort being made to beautify the mind, or polish its highest order of manifestation. Let us develop by culture that beauty of style conferred on all by nature and on some so lavishly. If men would but take half the pains to ornament their conversation that they do on dress, every sentence would be charming, and every book enchanting, and all interchange of ideas a perpetual feast. Let us all strive to beautify and perfect every sentence we utter or write. Simplicity is another important requisite in good style. Whatever is natural is therefore beautiful. And of this there is nothing more true than of the manner of expressing ideas. A strained, far-fetched, artificial style is always ill-proportioned and imperfect. Our words should be placed in nearly or quite the same order on paper as in speech. One of the greatest of faults of modern style is its departure from this oral and natural standard. One should write as he speaks, and speak as he writes. In other words—his conversation should be as correct as if it had to go to print. Let simplicity be the ruling

characteristic in all you say and write. Whoever is natural in this respect is therefore elegant.

As this chapter is headed, before I close, I will say a few words respecting good manners.

As conversation is one of the chief factors in demonstrating manners. I dwelt more elaborately on that very important subject. Good manners is the out-growth of a true intelligent Gentlemen or Lady, and in order to improve our manners, as before said, we must improve our conversation, and next we should choose for our associates the intelligent and the well-bred. We should select those of high culture and those, who are refined, and those, who love the beauties of nature and shun the vulgar.

The character of literature, we read imparts to us much of our characteristics. It, therefore, becomes a very important matter to select the proper books for our reading. What we learn in school, merely prepares us to become informed. We then have before us, that is after we quit school, some of the greatest lessons and problems to deal with that we meet with during life. Our literature should be of a chaste elevated, and ennobling character. We should select books, that inform us on men and manners, which is really of far more use to us than our greek and latin, french and german, or any other foreign language. To be able to tell just whom to trust and whom not, and whom to associate with, and whom not, is one of the most important forms of knowledge we can invest in.

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